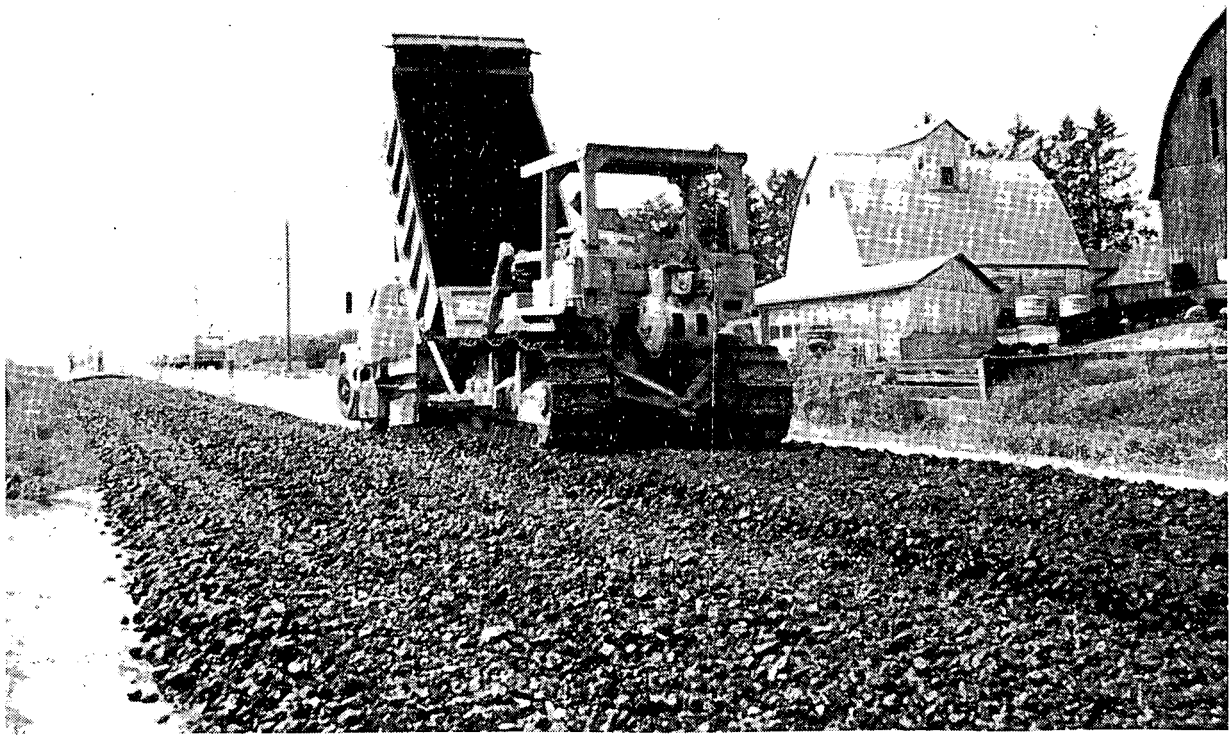
Field Copy

Asphalt Emulsion Bound Macadam in Dubuque County, Iowa



Construction Report
Iowa Highway Research Board
Project HR-216

U.S. Department of Transportation
Federal Highway Administration
Contract No. DTFH-71-80-55-IA-02

DEPARTMENT OF TRANSPORTATION
IOWA

Highway Division
January 1981

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CONSTRUCTION REPORT

IOWA HIGHWAY RESEARCH BOARD

PROJECT HR-216

U.S. DEPARTMENT OF TRANSPORTATION

CONTRACT NO. DTFH-71-80-55-IA-D2

ASPHALT EMULSION BOUND MACADAM

BY

CHARLES L. BAULE, P.E.
DUBUQUE COUNTY ENGINEER

JANUARY 1981

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ASPHALT EMULSION BOUND MACADAM

DUBUQUE COUNTY PROJECT SN-4657(3)--51-31

IOWA HIGHWAY RESEARCH BOARD PROJECT HR-216

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

DEMONSTRATION PROJECT NUMBER 55

INTRODUCTION

Recent years have presented a real financial challenge for highway departments. The energy shortage and rapid inflation have resulted in a severe reduction in proposed programs. The result has been an increased emphasis on investigating alternative roadway sections and construction procedures.

Many secondary roadway departments have utilized macadam base construction with varying degrees of success. Macadam base construction does appear to have a potential for providing the structural needs at a lower cost.

The recent macadam base projects have provided excellent drainage characteristics but there is an apparent lack of stability. Even when the base is properly rolled and keyed together, the large stones are easily displaced. The use of an asphalt emulsion binder may increase stability--while still providing a relatively low cost roadway base--and reduce energy consuming construction costs.

OBJECTIVE

The project objectives are:

1. Identify a cost effective asphalt emulsion bound macadam typical cross section.
2. Obtain useful data comparing seven typical cross sections.
3. Determine the effectiveness of engineering fabric placed under macadam roadbeds.
4. To evaluate the use of emulsions in surface seal coats. (See Appendix A)

PROJECT LOCATION

The project is located on Dubuque County Road D-53 from U.S. 151 south and easterly for 5.855 miles through Bernard, Iowa (See Appendix B). This highway serves as a feeder road from U.S. 151 to U.S. 61 and is a shortcut across the country.

TRAFFIC DATA

Traffic counts vary on the roadway from 114 vehicles per day to 235 vehicles per day, with approximately 50% of the traffic being trucks. The growth rate of traffic will increase now that the roadway has been paved. The traffic prediction for 22 years hence is a 47.3% increase from 1978 traffic counts or a maximum of 346 VPD in the year 2000.

TEST SECTIONS

Test sections (See page 22) were the full width of the roadway base which was approximately 36 feet in width. Each test section was repeated along the 5.855 mile route. Under the first seven test sections, engineering fabric was placed in two 200 foot lengths. One fabric used was Bidim C22 (60 mils) and the other was True Tex MG-300 (110 mils).

Posts were placed near the fence to identify section and fabric locations.

Section 1: 2,400 feet and 2,100 feet of 2" Type B Class I asphaltic concrete 24 feet wide over a 6" asphalt treated base with granular shoulders that received a double seal coat for a shoulder surface.

Section 2: 2,405 feet and 2,100 feet of 2" Type B Class I asphaltic concrete, 24 feet wide over 6" of 3" x 3/4" asphalt emulsion bound macadam the full width of 36 feet and a double seal coat over the granular shoulders.

2203.5

Section 3: 2,065 feet of 3" Type B Class I asphaltic concrete 24 feet wide over 6" emulsion bound macadam base the full width of the base area with a double seal coat on the granular shoulders. The intended repeat cross-section (1910 feet) was modified to 26 feet of emulsion bound macadam and plain macadam shoulders.

Section 4: 2,100 feet and 2,400 feet of 3" Type B Class I asphaltic concrete 24 feet wide placed over 2" of 3/4" choke stone the full width of the 6" macadam base section of the roadway, with a double seal coat on the granular shoulders.

Section 5: 2,100 feet and 2,400 feet of 3" asphalt emulsion bound choke stone 24 feet wide over 6" emulsion bound macadam the width of the base and granular shoulders. The final surface has a double seal coat from edge to edge of the roadway.

Section 6: 2,100 feet and 2,400 feet of 3" asphalt emulsion bound choke stone 24 feet wide over 2" of 3/4" Class A choke stone the full width of the 6" plain macadam base section with granular shoulders. There is a double seal coat over the entire surface from edge to edge of the roadway.

Section 7: 2,100 feet and 2,200 feet of 3" granular choke stone over the 6" plain macadam base with a double seal coat the width of the roadway.

ASPHALT TYPES USED

AC-10 asphalt was used for the asphaltic surface courses and the asphaltic base courses. Tack coats and prime coats were MC-70 liquid asphalts. Emulsions used were the High Float type HFE 150 for the emulsion bound macadam and the emulsion bound 3/4" choke stone. SS-1 emulsion was tried for the 3/4" choke stone and the 6" emulsion bound macadam with unsatisfactory results. High Float emulsion HFE 90 was used for all seal coating. All asphalt was obtained from Koch Asphalt Company Terminal at Dubuque, Iowa. The HFE 90 and HFE 150 fall in the AASHTO HFMS-2 range.

AGGREGATE USED

Aggregates were obtained from the following sources: Type B asphalt sand aggregate from Bellevue Sand and Gravel Co. Crushed stone aggregate from Mar Jo Quarry, Beecher Quarries, Ltd., located at Sec. 5-88-3E Dubuque County. Macadam aggregate was made by Beecher Quarries, Ltd. All macadam came from Sec. 22 and 23-87-1E Dubuque County. This aggregate was 3" to 3/4" in size. Three-fourths inch choke stone was made at the same quarry as the macadam aggregate. Granular shoulder stone and granular macadam choke stone was also made at the same quarry the macadam was manufactured. The washed aggregate limestone chips were manufactured at the quarry located in Sec. 35-87-2W in Dubuque County. See Appendix C for materials tests.

SEQUENCE OF CONSTRUCTION

The project started on August 14, 1980 and was completed on October 2, 1980. Tschiggfrie Excavating Company was the contractor. A copy of the contract is in Appendix D. The subgrade was prepared by Dubuque County maintenance forces. Three motor patrols shaped the 5.855 miles a week before the contractor started the project. The subgrade was checked by the Iowa Department of Transportation Road Rater for which data is shown in Appendix E. Special Provisions for the project are in Appendix F.

Section number 7 - Station 131+00 to 152+00 and 286+00 to 308+00 was started first. The 3" x 3/4" macadam was placed with a Jersey spreader attached to the front of a D7 Caterpillar tractor. The base was placed in 3 passes with the first two at the edges of the roadway. The center section was laid last, which caused a higher elevation of the center section. The contractor then bladed the center section with a motor patrol. This procedure was stopped because it caused segregation of the large and smaller rock and created voids larger than necessary on the surface of the macadam. This is not the recommended procedure to get the best results. The contractor changed the method of macadam placement after unsatisfactory results from the first few sections.

The contractor then placed the 3" x 3/4" macadam in three separate passes from left to right with no blading after placement with the Jersey spreader. This same procedure was used on the emulsion bound macadam to prevent segregation. After the 3" x 3/4" material was laid, the choke stone was placed on top, bladed, shaped and compacted. The top was primed with MC-70 asphalt and a double seal coat placed over the entire section. All base materials were placed from Station 214+00 to Station 308+00 before construction of the surface course in the respective sections.

In section number 6 - Station 111+00 to 131+00 and 262+00 to 286+00 the 3" x 3/4" macadam was placed the same as that in Section number 7. However, the 3/4" emulsion bound choke stone became a problem. A 3" lift of emulsion bound choke stone was placed in one lift with an asphalt paving machine. It was decided that this was too thick to allow the moisture to escape, so two lifts of 1-1/2" increments were used to achieve the desired design criteria. Both high float and SS-1 emulsions were tried, but neither successfully coated the choke stone. Therefore, the placement of the 3/4" emulsion choke material was stopped until a solution to the coating problem was found.

The final decision was to clean up the 3/4" stone which was screened from the 3" x 3/4" macadam stone. The specifications called for a maximum of 5% passing the #200 sieve; however, after field trials, it was determined that less than 4% passing the #200 sieve was required before the choke stone would coat properly.

It is very important that the material passing the #200 sieve is kept to a minimum. One percent can make a great deal of difference in the emulsion's coating ability. All emulsion bound materials were mixed in a Pioneer pug mill at the quarry site Sec. 22, 23-87-1E.

In Section number 5- Station 89+00 to 110+00 and 238+00 to 262+00 emulsion bound macadam--the 3" to 3/4" stone had the same coating problems as the 3/4" choke stone; the material passing the #200 sieve could not be more than 4%. The specifications had no limits on the #200 sieve but the more passing the #200 sieve, the worse the coating of the stone. Unusually high rainfall (page 33) during aggregate production substantially impaired screening efficiency resulted in problems of removing the fines from both the macadam and choke stone. This created a problem for the rock producer, Beecher Quarries, Ltd., where all large stones had to be screened to get the fines below 4% passing the #200 sieve. Once this was done, the coating was good on the large stone. High Float 150 was used on the large stone as was the SS-1. On this project, with the mixing procedures utilized, the better results were obtained with the high float emulsion. Based on laboratory results, increased moisture content of the aggregate (high rainfall) resulted in poorer aggregate coating. The emulsion bound macadam bases were laid with the Jersey spreader following the same procedure used with the plain macadam sections.

Section number 4 - Station 68+00 to 89+00 and 214+00 to 238+00 was placed the same as the plain macadam then choked off with 3/4" choke stone and surfaced with 3" of Typc B Class I AC-10 asphaltic concrete. The granular shoulders were sealed with two coats of HFE 90 emulsion.

Section number 3 - Station 47+35 to 58+00 and 194+00 to 213+10 was designed to have a 3" Type B Class I AC-10 asphaltic concrete surface course. However, due to no choke stone on the emulsion bound macadam, it took approximately 4" of asphaltic concrete to obtain the 3" cover over the macadam. The Type B asphalt was placed with a standard asphalt paving machine.

Section number 2 - Station 23+00 to 47+05 and 173+00 to 194+00 was designed to have a 2" Type B Class I surface. It took about 3" of the Type B Class I AC-10 asphaltic concrete to cover the emulsion treated macadam.

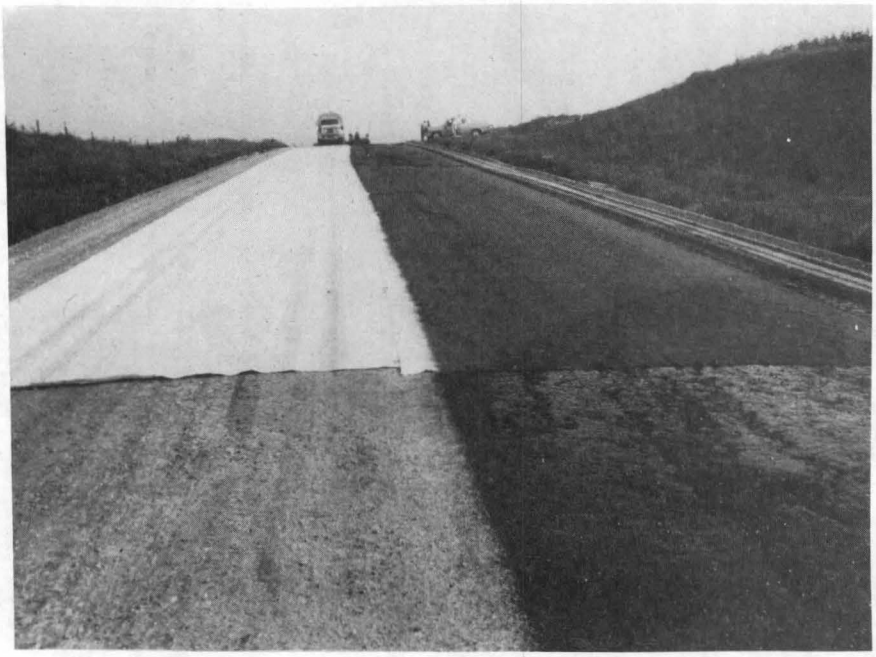
Section number 1 - Station 0+00 to 23+00 and 152+00 to 173+00 was 8" full depth asphalt construction. A 6" base was placed in 2-3" lifts and a 2" mat was placed on top. The shoulders were granular Class A stone and double seal coated with an HFE 90 emulsion.

PHOTOGRAPHS OF CONSTRUCTION

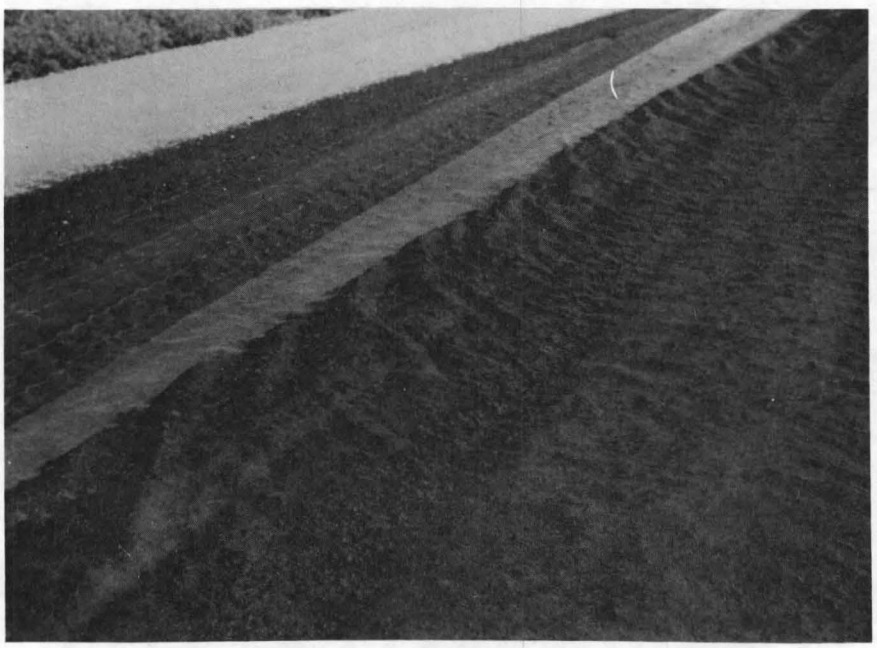
The following pages demonstrate the construction techniques used in the project.

Iowa Department of Transportation employees placed the engineering fabric.

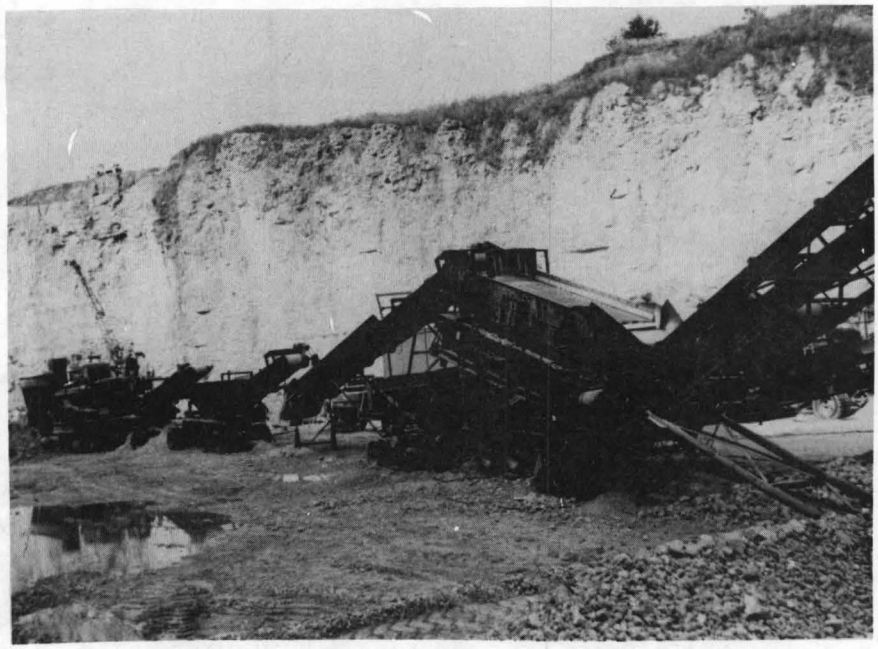
Engineering fabric at Station 10+00 to 12+00.



Spraying the fabric helped to hold it in place. Figure 2



Fabric shows wrinkles due to trucks traveling at too great a speed. The wrinkles could not be removed.



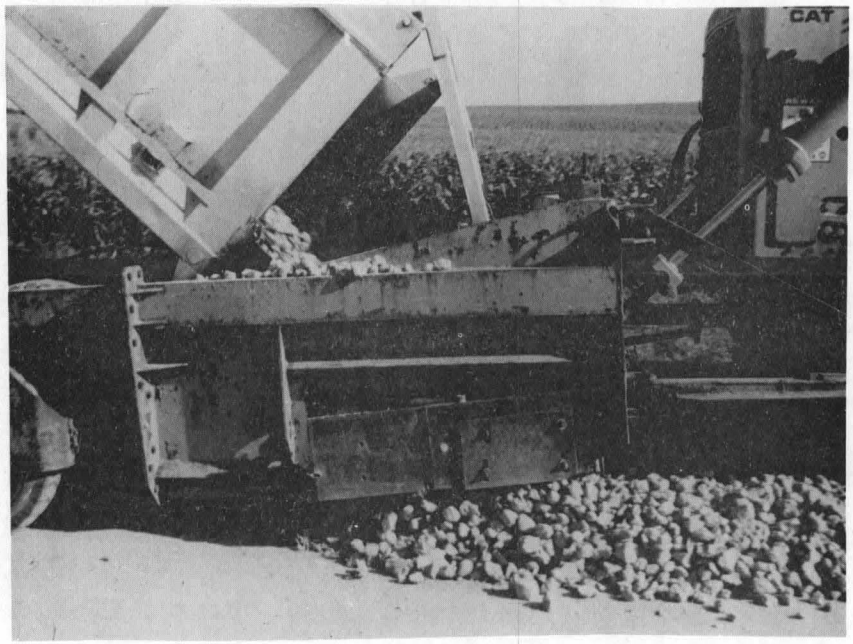
Meloy Quarry in Sections 22 and 23, T87N-RIE where Beecher LTD crushed the 3" macadam, 3/4" chokestone and the 3/4" class A stone.

Plain macadam 6" base being placed.

Jersey spreader finishing the center pass.

Figure 3

Motor grader working the excess macadam. This is not the recommended procedure since it causes segregation of the stone.



Jersey spreader laying the loose macadam.

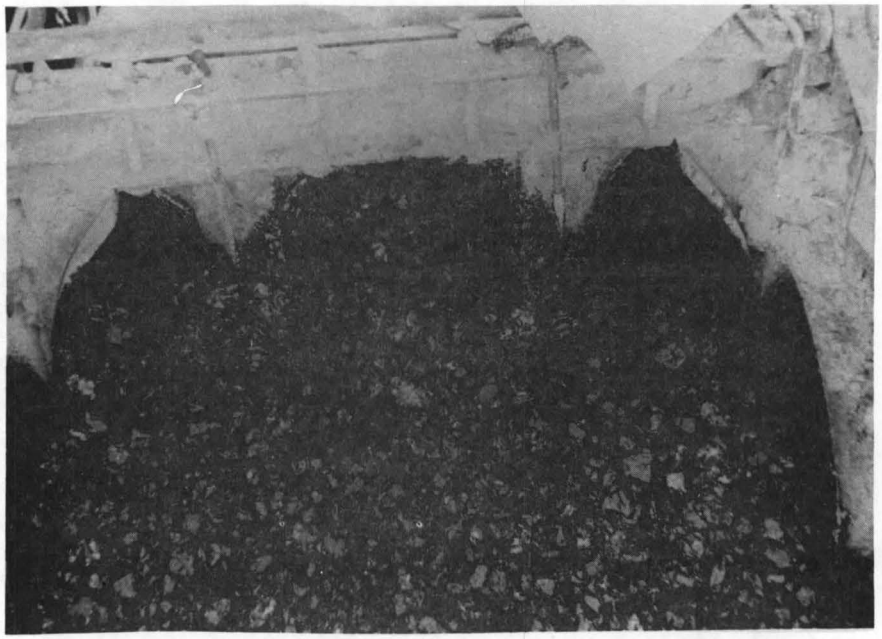
3" macadam, in place, showing the voids between the large rock.

The picture shows the fines attached to the larger rock.

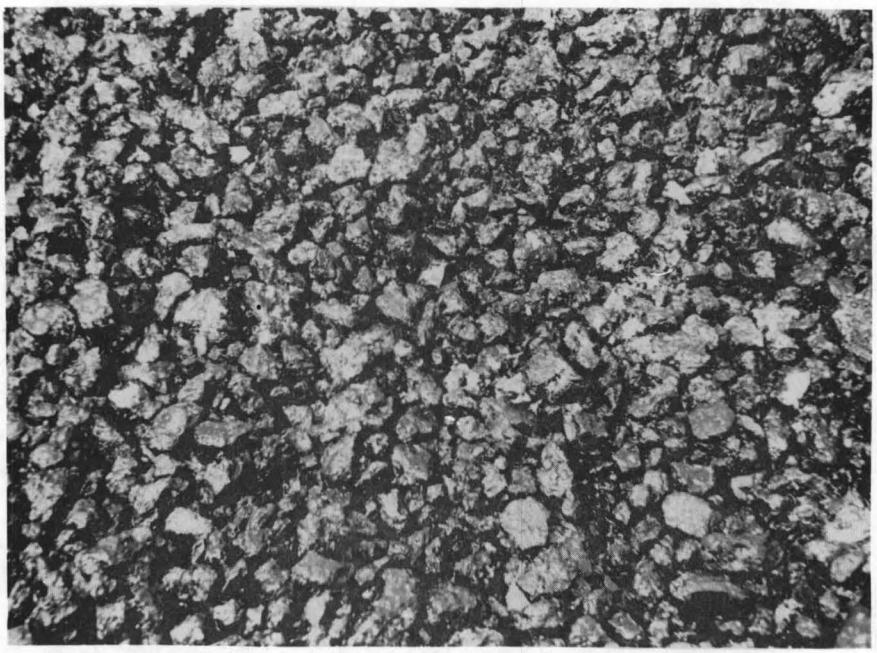
Tschiggfrie Excavating's Pioneer pugmill at Meloy Quarry.

3" emulsion bound macadam rejected due to poor coating.

Good coating versus poor coating of the emulsion bound chokestone.



Good coating of the emulsion bound macadam at the pugmill.

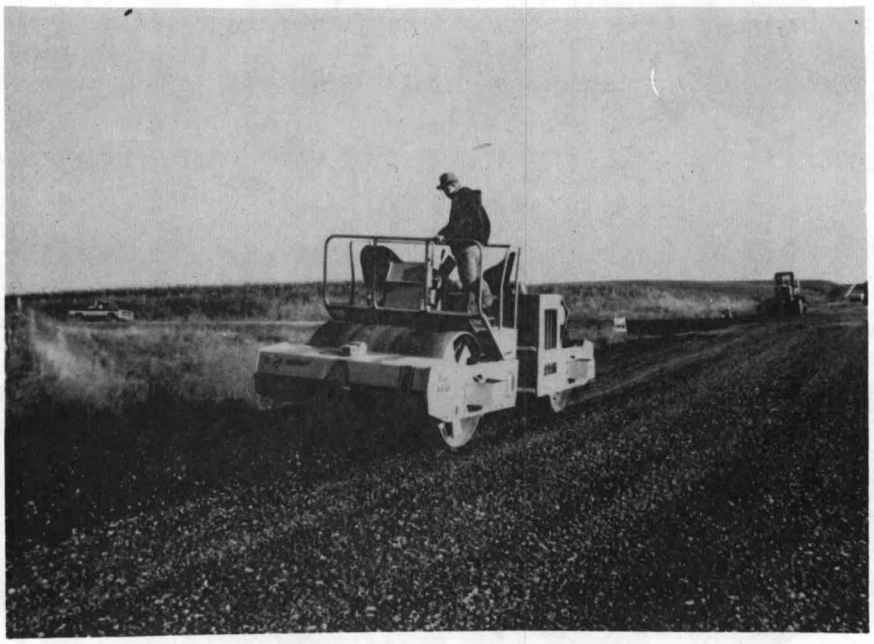


Emulsion bound macadam with good coating on the roadway.

Jersey spreader with Cat tractor placing the 3" emulsion bound macadam in section 2.

Figure 4

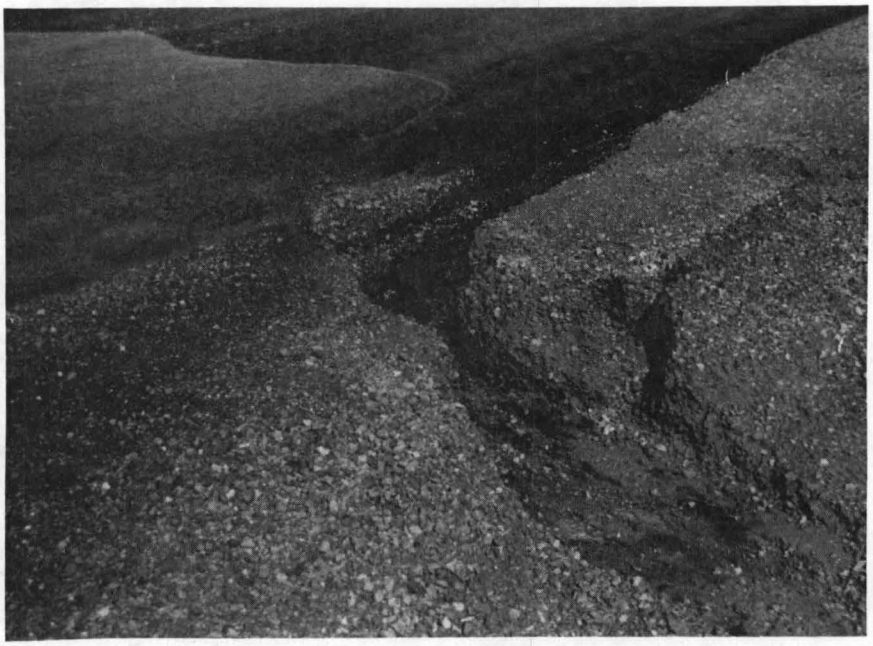
3" emulsion bound macadam base showing water running to the ditch.



Vibratory roller passing over the emulsion bound macadam. The roller had a tendency to break the larger rock at the surface.

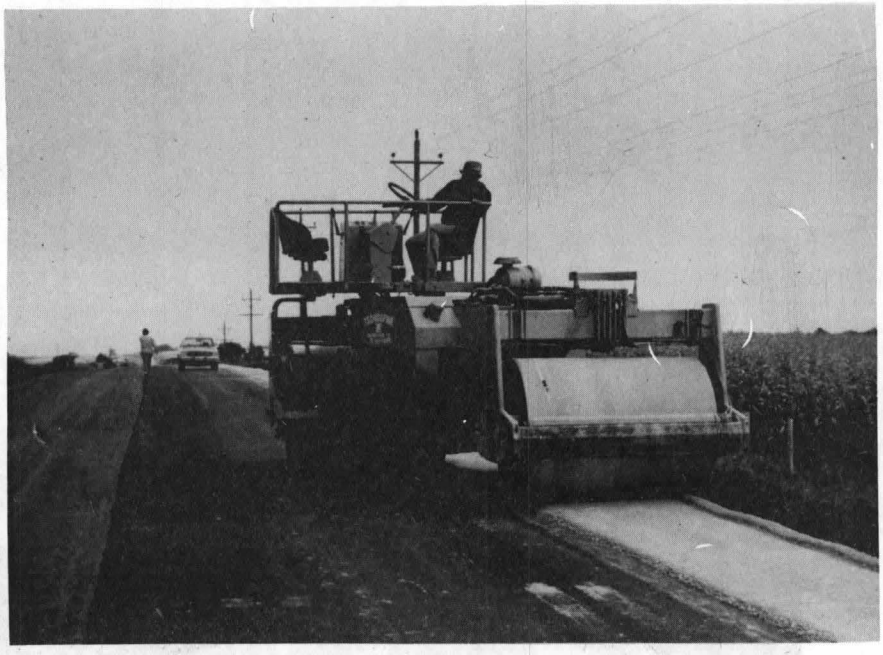
The final 1½" mat being laid over the initial mat of the 3/4" emulsion bound chokestone.

Figure 5



Shoulder erosion caused by heavy rains between stations 152+00 and 173+00.

Tschiffgrie's equipment placing the seal coat.



Offset roller compacting shoulder material.

Final roadway. Section 3 looking westerly at Station 68+00.

Section 6 with final seal coat looking easterly at station 131+00.

CONCLUSION

The 3/4" emulsion bound choke stone was unsatisfactory as a covering course for the macadam bases. It was difficult to lay down with a paving machine and was difficult to get a smooth surface.

The center pass of the Jersey spreader tended to take the crown out of the roadway when three passes were employed during construction. During construction, it was found that two passes with the Jersey spreader worked very well with the emulsion bound macadam. One pass on each side of the centerline was placed and rolled. The shoulders were placed using a shouldering machine with clean macadam. This is the way section number 3 from Station 194+00 to Station 213+10 was constructed.

The future of this type of construction will be based on the cost. If a similar project was to be constructed, not less than 6" of emulsion bound macadam base would be recommended and that would be placed in two passes side by side of the centerline for a width of 26 feet. The shoulder areas would be filled with plain macadam. This would eliminate the cost of emulsion to the shoulder areas.

Average Cost of the Various Sections One Through Seven:

No. 1	$159,713.21	Total Length	4,500 feet
No. 2	$140,368.71	Total Length	4,505 feet
No. 3	$138,600.53	Total Length	3,975 feet
No. 4	$119,135.21	Total Length	4,500 feet
No. 5	$129,032.80	Total Length	4,500 feet
No. 6	$108,561.32	Total Length	4,500 feet
No. 7	$ 74,254.63	Total Length	4,300 feet

The final inspection found some areas where the first and second seal coats were not bonded together. This was evident in the seal coated Sections 4, 5, 6, and 7 and only occurred at various places: at Station 256+00 near the centerline, at 253+50 near centerline, 124+00 near centerline, and at

117+25 near the centerline. These areas were failures of the two seal coats to attach to each other. This may be due to loose clean rock which was not completely broomed off at these spots when the second seal coat was applied. These areas were broomed clean and resealed. Other than these spots, the entire roadway has no other failures except some base failure in the 6" macadam area in Section 14 near Station 296+00 near the center of the west bound lane. This area also has been resealed after evidence of the base failure.

ACKNOWLEDGEMENTS

This research project was sponsored by the Iowa Department of Transportation through the Iowa Highway Research Board, Dubuque County and the U.S. Department of Transportation Federal Highway Administration. Special thanks to the Dubuque County Board of Supervisors - Wilfred Bahl, Donna Smith and Lloyd Hayes for giving their approval of the project; Pat Horsfield of Tschiggfrie Excavating; Robert Beecher of Beecher Quarries, Ltd.; Larry Schreiner, William Miteff and Jerry Reinke of Koch Asphalt, and the Dubuque County Highway Department Personnel involved in the project with noted appreciation to Lee Eisbach. Vernon Marks, Steven L. Tritsch and Richard D. Smith of the Iowa Department of Transportation provided valuable assistance.

The opinions, findings, and conclusions of this report are those of the author and not necessarily those of the Highway Division of the Iowa Department of Transportation or the Federal Highway Administration.

APPENDICES

Appendix A

Evaluation Plan

Asphalt Emulsions for Seal Coating for Highway Construction

EVALUATION PLAN

ASPHALT EMULSIONS FOR SEAL COATING FOR HIGHWAY CONSTRUCTION

CONSTRUCTION CRITERIA and PROCEDURE

A) Surface Preparation and Repairs

All new construction of subbase,3" macadam, 3" emulsion bound macadam, 3/4" chokestone and 3/4" emulsion bound chokestone were rolled, dampened, and compacted then primed.

B) Climatic Condition during Construction

(Including roadway surface temperatures.)

Date	Time	Temperatures Surface	Air	Sky
9-24	8:00	60	55	Clear
	12:00	64	65	Clear
	3:00	65	66	Clear
9-25	10:00	67	63	Cloudy
	1:00	63	58	Cloudy
	3:00	65	58	Cloudy
9-29	8:00	62	54	Clear
	12:00	74	75	Clear
	3:00	75	75	Clear
9-30	10:00	70	70	Clear
	12:00	70	70	Clear
	2:00	70	68	Clear
10-01	10:00	68	65	Clear
	12:00	70	71	Clear

C) Noted Changes in Material Properties at Jobsite

(1) Moisture content: 1 to 1.5%

(2) Gradation: 1/2" limestone chips

% Passing

Date	3/4"	1/2"	3/8"	4	8	200
8-13	100	97.1	72.1	26.4	3.3	.8
8-20	100	97.0	63.2	16.3	1.4	.6

Taken from Stockpile

(3) Asphalt: HFE 90 supplied by Koch Asphalt Dubuque terminal.

(4) Settlement: no settlement taken from suppliers tanks, the emulsion was distributed the same day of delivery.

D) Asphalt Spraying Operation

Intended amount of gallons per square yard:

1st Lift was .35 gal. s.y.

2nd Lift was .30 gal. s.y.

Average application rate per square yard

Date 9-24 Section 6 1st Lift .40

2nd Lift .32

	Section 7	1st Lift	.32
		2nd Lift	.31
	Section 5	1st Lift	.29
		2nd Lift	.36
	Section 4	1st Lift	.36
		2nd Lift	.34
Date 9-25	Section 1	1st Lift	.31
		2nd Lift	.33
	Section 2	1st Lift	.31
		2nd Lift	.33
	Section 3	1st Lift	.34
		2nd Lift	.36
	Section 4	1st Lift	.36
		2nd Lift	.38
	Section 5	1st Lift	.33
		2nd Lift	.34
Date 9-29	Section 7	1st Lift	.33
		2nd Lift	.31
	Section 6	1st Lift	.36
		2nd Lift	.28
	Section 1	1st Lift	.36
		2nd Lift	.30
	Section 2	1st Lift	.36
		2nd Lift	.30
	Section 3	1st Lift	.36
		2nd Lift	.40
Date 9-30	ALL SECOND LIFTS		
	Section 3		.35
	Section 2		.35
	Section 1		.35

Date 10-1 1st and 2nd seals on driveways

AVERAGE TEMPERATURES ^{o}F

Dates	Emulsion	Air	Surface
9-24	170	64	65
9-25	160	61	65
9-29	143	68	69
9-30	150	72	71
10-01	150	65	67

Spraying patterns varied according to roadway cross-sections. The shoulders were sprayed a width of 7' to help prevent shoulder washing and sloughing.

E) Asphalt Distributor Data

Type: Etnyre 1980 Model BT HA
Calibration: Calibrated by Iowa Department of Transportation
Productivity: 6,750 gallons capacity
Bar Height was 13"
Condition of heaters: 1980 unit used L.P. gas - all new
Pumps: Etnyre, capacity of 400 gallons per minute
Measuring Devices: Calibrated tank stick measurement
Nozzles: Slotted 1/8" nozzles, full set

F) Aggregate Spreading Operation

Intended lbs. per square yard
1st Lift was 30
2nd Lift was 25

Average application rate per square yard:

Date	9-24	Section 5	1st Lift	28.7 lbs
			2nd Lift	26.4
		Section 6	1st Lift	29.3
			2nd Lift	27.0
		Section 7	1st Lift	32.2
			2nd Lift	34.2
		Section 4	1st Lift	30.9
			2nd Lift	31.2
Date	9-25	Section 1	1st Lift	32.9
			2nd Lift	37.7
		Section 2	1st Lift	32.9
			2nd Lift	37.7
		Section 3	1st Lift	32.9
			2nd Lift	37.6
		Section 4	1st Lift	32.8
			2nd Lift	37.7
		Section 5	1st Lift	30.6
			2nd Lift	30.3
Date	9-29	Section 6	1st Lift	33.1
			2nd Lift	33.1
		Section 7	1st Lift	37.3
			2nd Lift	30.9
		Section 1	1st Lift	29.6
			2nd Lift	31.6
		Section 2	1st Lift	29.6
			2nd Lift	31.6
		Section 3	1st Lift	31.1
			2nd Lift	31.5
Date	9-30	Section 3	2nd Lift	31.2

and driveways.

F) Aggregate Spreading Operation (continued)

Productivity: seal coat project was completed in four and one-half days. 2,647.25 tons of 1/2" chips were used on the project.

Patterns: Limestone chips were placed on the road at spreads from 14' to 11'. Chips were spread 7' wide on the shoulders.

G) Aggregate Spreader Data

Type: 1980 Flaherty Chipper
Adjustments IAW Manufacturer Specifications: No adjustments had to be made to meet the specs.

H) Rolling Operation

Type: Contractor used two types:
Steel - RayGo. #266
Rubber - Michigan #140
Patterns: Contractor began rolling with rubber tires followed by steel. They worked from outside to inside.
Weights: Steel - RayGo #266 12 to 14 tons.
Rubber - Michigan #140 10 to 12 tons.
Timeliness: A very efficient operation. Rolling began within minutes after aggregate was spread on the emulsion.
Condition & Adjustments of Equipment: The condition of the rollers was excellent and no adjustments were made. They both met the Iowa Department of Transportation specs.

I) Brooming and Other Cleaning Operations

Type: Broom was Brosc Broom 1976, self-propelled. The only brooming done was light broomings over primed areas where excess material was placed. Brooming was done between first and second lifts where excess aggregate had accumulated. All chips had been washed before project started.

J) Breaking and Curing Characteristics of Emulsion

The breaking and curing seemed to occur in a very short time. The emulsion was black in color, then turned brownish as it was sprayed from the distributor. The emulsion broke. Within a matter of minutes it would turn black and start curing.

K) Total Mat Thickness

Examining the project after completion, we determined the mat thickness to be an average of 3/4".

IV COST OF ALTERNATE MATERIALS

This is a cost comparison of emulsion used on the project and asphalt cutback MC800 for the same type of surface treatment.

The cost of emulsion per gallon on contract was 75¢ per gallon times 55,946 gallons of emulsion used = $41,959.50.

Cost of MC 800 per gallon as a comparison as taken from a contract with the same contractor during the same year, 1980:

Cost of MC 800 98¢ per gallon times 55,946 gallons used = $54,827.08.

+	54,827.08	MC 800
-	41,959.50	Emulsion
$	12,867.58	Total Savings

Information received from Koch Asphalt determined that there was an additional savings of an average of 400 gallons of fuel oil used for plant operation per day, or 59,400,000 B.T.U.'s a day of production.

V ENERGY CONSUMPTION

See letter on following page.

VI ENVIRONMENTAL CONSIDERATIONS

There are no local or state environmental regulations concerning asphalt emulsions. There are no local or state regulations concerning HC emissions.

KOCH
ASPHALT COMPANY
Division of Koch Fuels, Inc.

January 15, 1981

Mr. Charles Baule
Engineer's Office
Dubuque County Courthouse
720 Central
Dubuque, Iowa 52001

Dear Mr. Baule:

Per your request, I have the following information in reference to energy consumption, comparing emulsions and cutbacks. For this comparison, I am referring to MC 800 as the cutback material that would have been used for this project, instead of the high float emulsion.

Our terminal burns #3 fuel oil for the required heat needed to produce the materials we supply, in this case, emulsion. The estimated volume of #3 fuel oil consumed per day for heating to supply an emulsion would be 200 gallons or 29,700,000 BTU's. Comparing this to a cutback, the estimated volume of #3 fuel oil consumed per day would be 600 gallons, or 89,100,000 BTU's. In the operation area, emulsions save an estimated volume of 400 gallons per day of #3 fuel oil, or 59,400,000 BTU's.

There is also considerable savings in the area of distillates between an MC 800 cutback and the high float emulsion. An MC 800 cutback requires 20% distillate. Using the figure 240,848 gallons (which was the amount of emulsion used), 48,170 gallons of distillate would be required to produce the MC 800 needed for this project. The high float emulsion designed for the project also contained distillate, but the overall average was only 5%. This amounts to 12,042 gallons of distillate, a savings of 36,128 gallons of distillate.

In conclusion, it should be taken into consideration that the distillate used for MC 800 is #1 range oil, and the distillate used in high float emulsion is #2 fuel oil.

Sincerely,

Larry Schreiner

Larry Schreiner

Post Office Box 921 ■ Dubuque, IA 52001 ■ Telephone 319/556-1293
Executive Offices: Post Office Box 2338 ■ Wichita, Kansas 67201 ■ Telephone 316/832-5500

Environmental Weather Data from Dubuque Airport Office of National Weather Service*

Avg. Temp	Date	High	Low	Rain	Wind Direc.	Low (knots)	High
72	8-14	79	65	0	N		
69	15	76	61	0	N	5	12
62	16	67	52	1.6	N	10	15
67	17	76	57	.33	NNE	3	12
69	18	82	56	0	NNE	3	9
78	19	88	68	1.62	NNE	6	11
80	20	89	71	1.37	NNE	7	12
75	21	80	69	0	NNE	8	14
70	22	81	59	0	N	3	7
69	23	80	58	0	NNE	4	11
71	24	81	61	0	NNE	7	13
75	25	84	65	0	NNE	10	12
75	26	86	64	0	NNE	4	21
74	27	84	64	0	N	7	12
73	28	82	64	0	N	3	7
78	29	86	69	0	N	3	13
68	30	72	64	.4	NNE	3	14
73	31	79	66	.1	NNE	5	9
71	9-1	78	64	.14	NNE	7	11
67	2	77	56	0	N	4	10
72	3	83	60	0	NNE	8	14
67	4	77	56	.83	NNE	5	14

*The National Weather Service Office is located 8 to 11 miles from this project at the Dubuque Municipal Airport.

Avg. Temp.	Date	High	Low	Rain	Wind Direc.	Low (knots)	High
68	5	81	54	0	NNE	3	10
71	6	82	60	.02	N	3	7
74	7	86	62	.75	N	7	15
78	8	89	66	0	NNE	5	8
66	9	77	55	.01	NNE	6	18
59	10	72	45	0	NNE	4	8
62	11	75	49	0	NNE	4	10
70	12	78	61	2.34	NNE	6	15
73	13	83	62	.25	NNE	4	12
59	14	64	54	Tr	NNE	8	10
60	15	66	54	0	NNE	4	13
57	16	63	50	.20	NNE	3	12
52	17	63	41	0	NNE	0	6
62	18	74	49	0	NNE	4	12
65	19	80	50	0	NNE	6	14
74	20	83	65	1.58	NNE	4	12
70	21	78	61	0	NNE	5	14
61	22	69	52	.22	NNE	4	14
52	23	62	42	0	N	3	7
56	24	66	46	Tr	NNE	4	9
53	25	60	45	Tr	NNE	4	15
50	26	61	38	0	NNE	0	6
59	27	68	49	0	N	4	12
59	28	66	51	.14	NNE	0	7
61	29	75	47	0	NNE	4	3
67	30	79	54	0	NNE	4	9
60	10- 1	69	51	0	NNE	4	15
51	2	62	40	.02	NNE	6	15

Appendix B

As Built Plans

LETTING DATE JULY 15, 1980

DUBUQUE COUNTY SN-4657(3)--51-31

37

IOWA
DEPARTMENT OF TRANSPORTATION
Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

FARM TO MARKET SYSTEM
DUBUQUE COUNTY

Beginning at U.S. Highway 151 in the S½ Sec 19 T87N-R1E, Thence South to near the ¼ corner Sec 30, Thence east to the SW¼ SW¼ Sec 25 T87N-R1E

RESEARCH PROJ HR-216 ROADWAY ~~PAVEMENT~~

SCALES AS NOTED

THE STANDARD SPECIFICATIONS, SERIES OF 1977, OF THE IOWA DEPARTMENT OF TRANSPORTATION SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT

PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND PROVISIONS

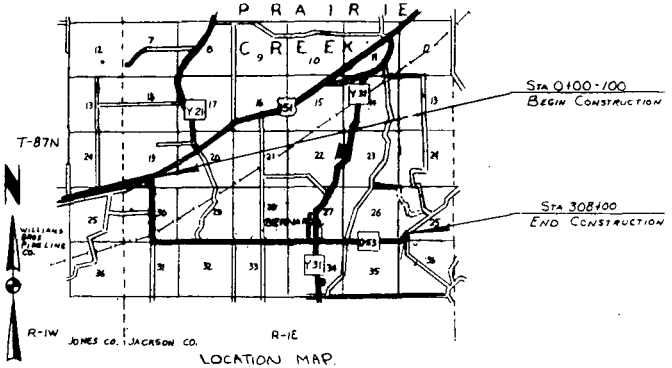
R.O.W. PROJECT NUMBER

CONVENTIONAL SIGNS

State Line
Co. Line
Twp. Line
Sec. Line
Corp. Line
Other Bdry.
R.C.W. Lines
Survey Line
Sec. Corner
Profile Grade
Railroad
Field Tile
Underground Lines
Culverts
Utility Poles
Fence
Trees Or Brush
Stream
Dike
County Road No.
Primary Road No.
U.S. Road No.
Interstate Road No.

PROJECT TRAFFIC CONTROL PLAN

The road will be closed to through traffic during construction. Local traffic to adjacent properties will be maintained as provided for in Article 1107.08 1977 Standard Specifications. Traffic control devices, procedures and layouts shall be as provided for by Supplemental specifications for traffic controls for street and highway construction and maintenance operations. Specification [illegible]



LOCATION MAP.

ESTIMATED ADT 2000 = 168 TO 346 VPD
ADT 1978 = 119 TO 235 VPD

LOCATION MAP SCALE
0 1 2 3
miles

-80-

INDEX OF SHEETS

NO	DESCRIPTION
1	TITLE SHEET, LOCATION MAP, MILEAGE SUMMARY, ESTIMATE PROJECT QUANTITIES, GENERAL NOTES
2	TYPICAL SECTIONS NO.1 THRU NO.7, TYPICAL SECTION NOTES
3 TO 15	PLAN AND PROFILE SHEETS

MILEAGE SUMMARY

TYPICAL SECTION NO 1	= 4500.0'	= 0.852	MILES
TYPICAL SECTION NO. 2	= 4505.0'	= 0.853	MILES
TYPICAL SECTION NO. 3	= 4113.5'	= 0.779	MILES
TYPICAL SECTION NO 4	= 4500.0'	= 0.852	MILES
TYPICAL SECTION NO. 5	= 4500.0'	= 0.852	MILES
TYPICAL SECTION NO. 6	= 4500.0'	= 0.852	MILES
TYPICAL SECTION NO. 7	= 4300.0'	= 0.815	MILES
TOTAL LENGTH PROJECT	= 30,918.5'	= 5.855	MILES

GENERAL NOTES

Item 1. Section 2203 Specification shall apply.
Item 2. Section 2202 Specification shall apply
Item 3. Section 4137 Specification shall apply
Item 4 Section 2124 Specification shall apply and SP 312
Item 5 Section 2307 Specification shall apply. First lift = 30 lbs sq yd. Second lift = 25 lbs sq yd
Item 6 Section 2307 Specification shall apply. First lift = 0.35 gal sq yd. Second lift = 0.30 gal sq yd. (HFE 90 or CRS-2)
Item 7 Section 2210 Specification shall apply. Primer = 0.30 gal sq yd Tack = 0.03 gal sq yd.
Item 9 Section 2210 Specification shall apply.
Item 11 Section 2210 Specification shall apply.
Item 8
Item 10
Item 12

Item No. 11 Shall include any Excavation required to meet existing Concrete, Asphalt and Bridge approaches. All Excavated material shall be disposed by the Contractor. No Extra Payment shall be made for Excavation or removal from Project Site

PROJECT QUANTITIES AS BUILD

ESTIMATE PROJECT QUANTITIES

ITEM	DESCRIPTION	UNIT	TOTAL	
1	BASE, TYPE B CLASS 1 ASPHALT CEMENT CONCRETE	TON	6815	[illegible]
2	ASPHALT TREATED BASE CLASS 2	TON	4370	[illegible]
3	ASPHALT CEMENT	TON	589	[illegible]
4	STABILIZED SHOULDER MATERIAL	TON	6455	[illegible]
5	ROADWAY COVER AGGREGATE (¾" CHIPS)	TON	2069	[illegible]
6	BINDER BITUMEN (EMULSION)	GAL	48761	[illegible]
7	PRIMER OR TACK COAT BITUMEN	GAL	24995	[illegible]
8	EMULSION TREATED MACADAM STONE BASE	TON	15850	[illegible]
9	MACADAM STONE BASE	TON	16040	[illegible]
10	EMULSION TREATED CHOKESTONE BASE	TON	4067	[illegible]
11	CHOKESTONE BASE	TON	6628	[illegible]
12	EMULSION (TREATED BASE MATERIAL)	GAL	263095	[illegible]

PROPOSED IMPROVEMENT FARM, MARKETS
PROJECT TO CONSIST OF THE RECONSTRUCTION OF THE ROADWAY

BRIDGE C-22

10 + 00 - 12 + 00	14 + 00 - 16 + 00
37 + 00 - 39 + 00	41 + 00 - 43 + 00
55 + 00 - 57 + 00	59 + 00 - 61 + 00
73 + 00 - 75 + 00	77 + 00 - 79 + 00
100 + 00 - 102 + 00	104 + 00 - 106 + 00
124 + 00 - 126 + 00	128 + 00 - 130 + 00
137 + 00 - 139 + 00	141 + 00 - 143 + 00

BIDIM C-34
EXTRA - 195+00 - 197+00
MATERIALS AND LABOR TO BE FURNISHED BY OTHERS

APPROVED

BOARD OF SUPERVISORS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED UNDER MY SUPERVISION AND THAT ENGINEERING DECISIONS WITH REGARD TO THE DESIGN WERE MADE BY ME OR BY OTHER DULY REGISTERED PROFESSIONAL ENGINEERS UNDER THE LAWS OF THE STATE OF IOWA

IOWA REGISTRATION NUMBER [illegible] DATE [illegible]

Highway Division

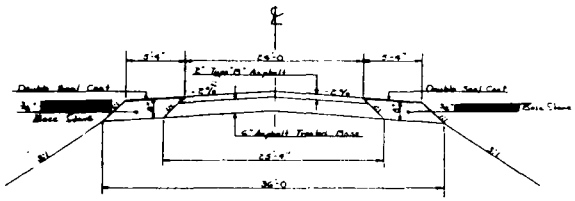
APPROVED FOR LETTING

[signature] 6-13-80

DEPUTY CHIEF ENGINEER DATE

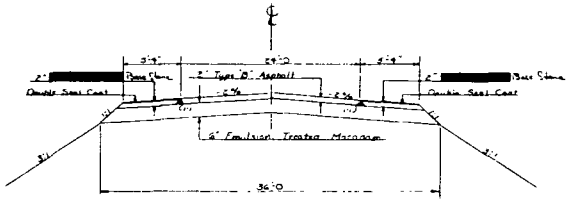
DUBUQUE COUNTY PROJECT NO. SN-4657(3)--51-31 SHEET NO. 1

TYPICAL SECTION NO. 1



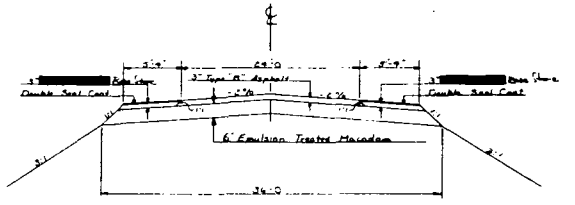
From Sta 0+00-100 To Sta 23+00 and
From Sta 152+00 To Sta 173+00

TYPICAL SECTION NO. 2



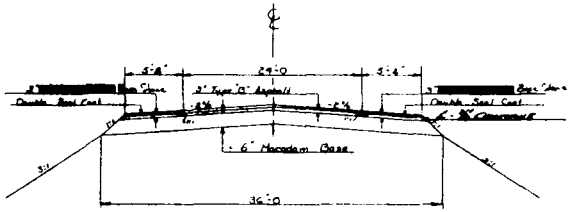
From Sta 23+00 To Sta 47+05 and
From Sta 173+00 To Sta 194+00

TYPICAL SECTION NO 3



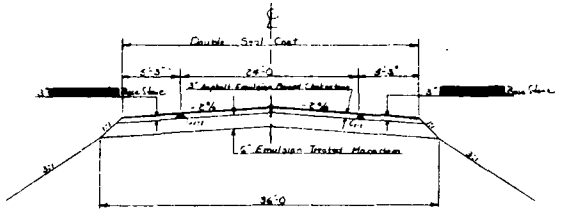
From Sta 47+35 To Sta 68+00 and
From Sta 194+00 To Sta 213+10
Equation at Sta 67+59.1 Lengthens 13B 5'

TYPICAL SECTION NO. 4



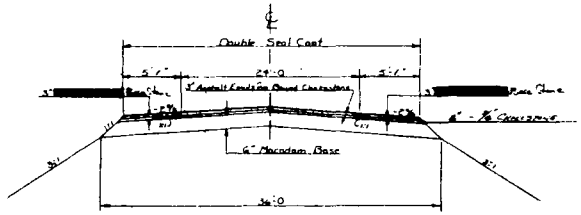
From Sta 68+00 To Sta 89+00 and
From Sta 214+00 To Sta 238+00

TYPICAL SECTION NO. 5



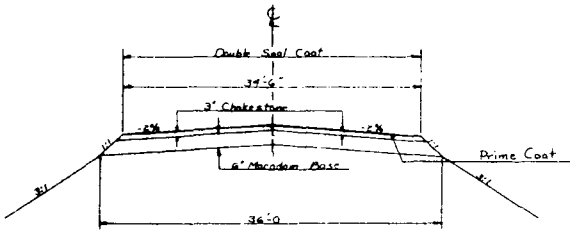
From Sta 89+00 To Sta 110+00 and
From Sta 238+00 To Sta 262+00

TYPICAL SECTION NO. 6



From Sta 110+00 To Sta 131+00 and
From Sta 262+00 To Sta 286+00

TYPICAL SECTION NO. 7

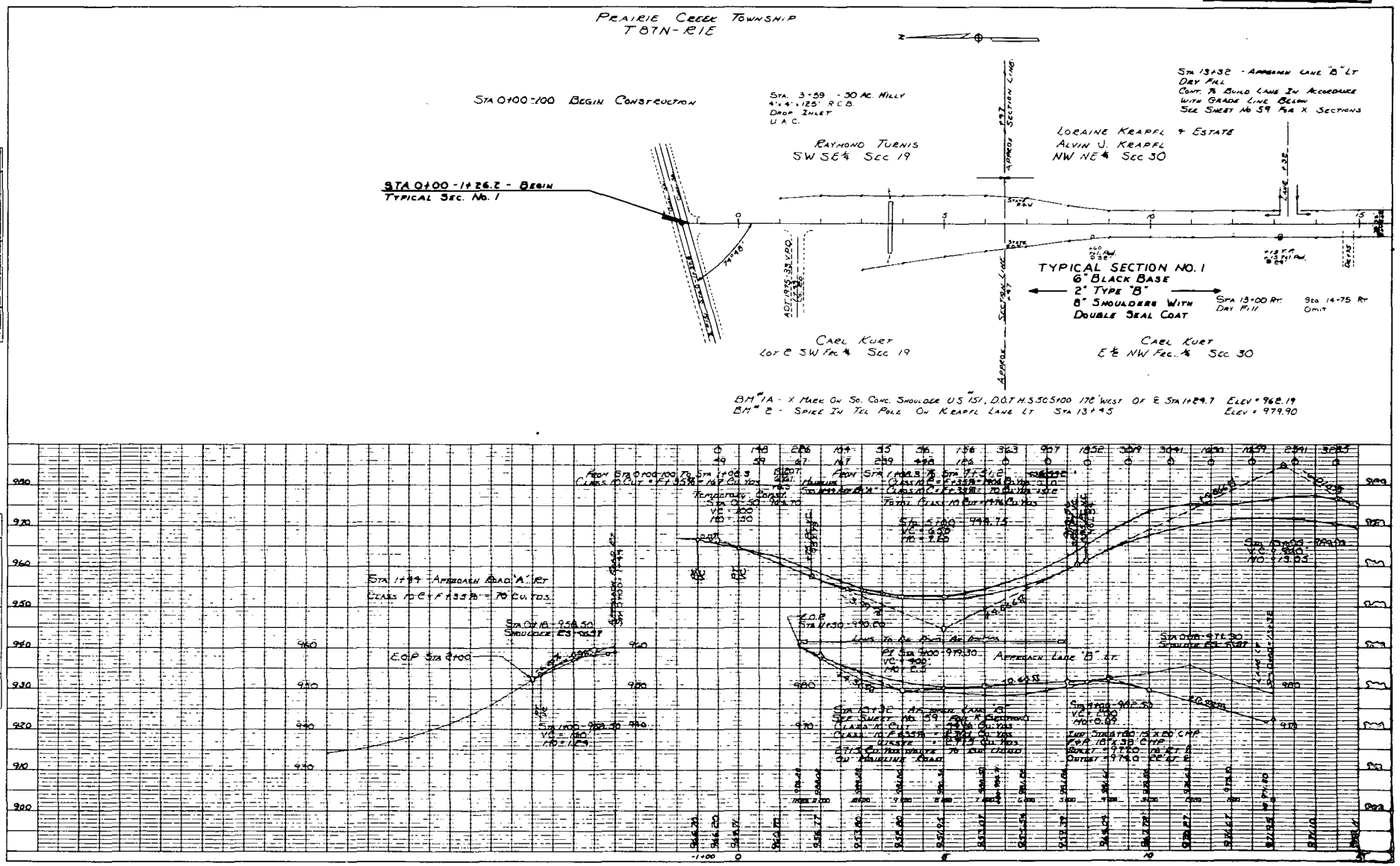


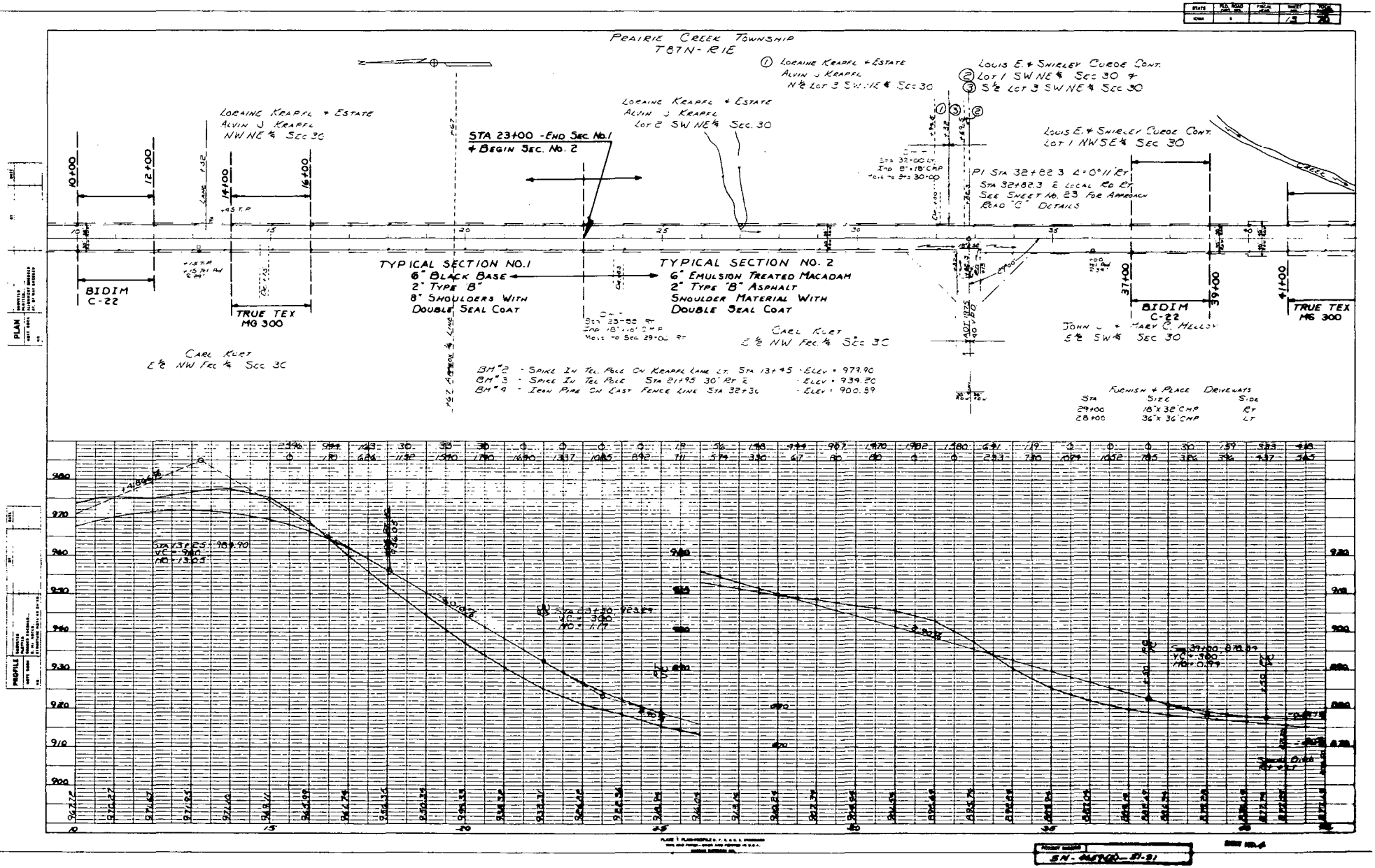
From Sta 131+00 To Sta 152+00 and
From Sta 286+00 To Sta 308+00

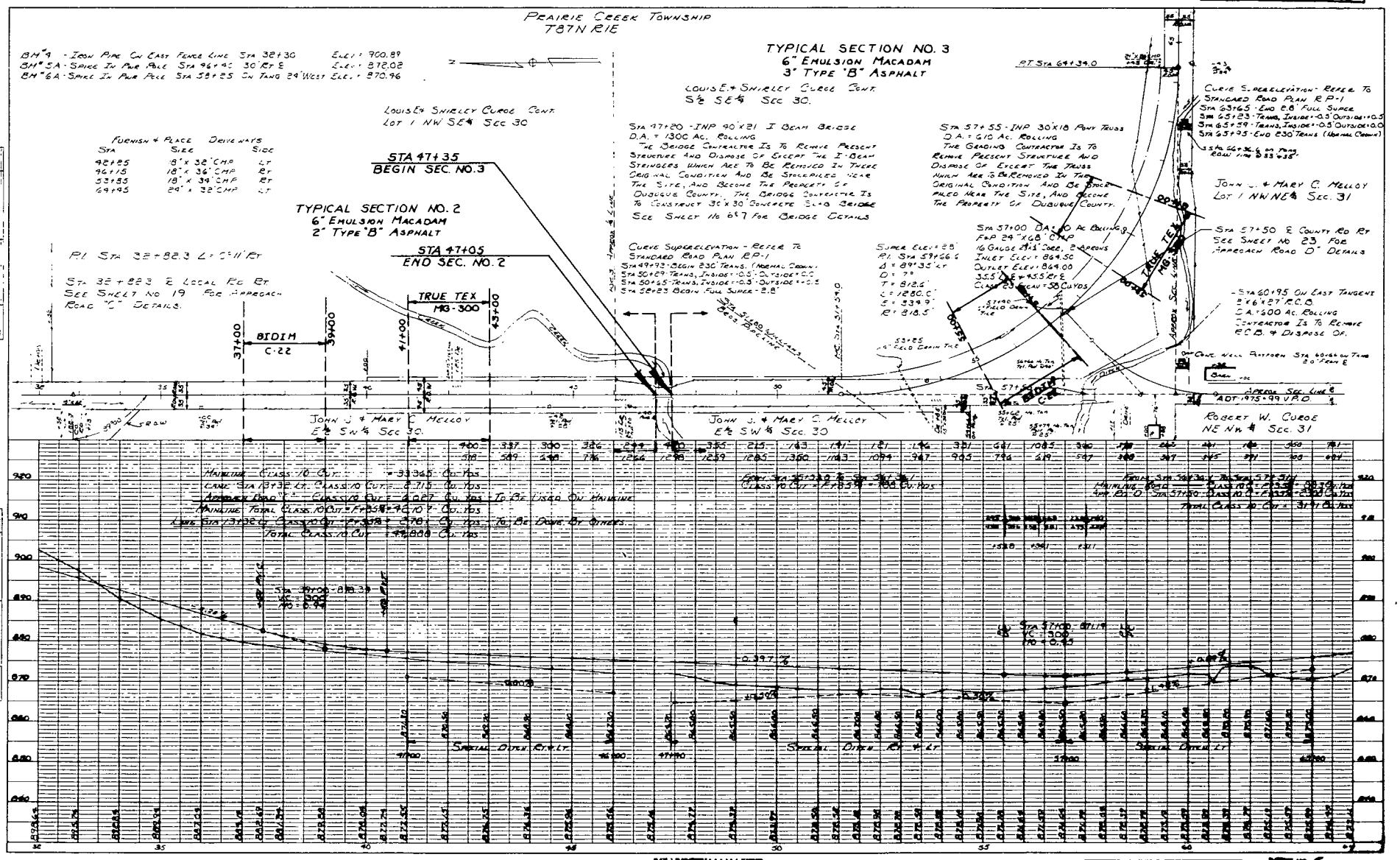
TYPICAL SECTION NOTES

SECTION NO. 1	Two inches of Type B asphalt surface over a 6" asphalt treated base (ATB) and 8" of ¾" base stone and double seal coat on the shoulders.
SECTION NO. 2	Two inches of Type B asphalt surface over 6" of 3"X ¾" asphalt emulsion treated macadam (AEBM) and 2" of ¾" base stone and double seal coat on the shoulders.
SECTION NO. 3	Three inches of Type B asphalt surface over 6" of 3"x ¾" asphalt emulsion treated macadam (AEBM) and 3" of ¾" base stone and double seal coat on the shoulders.
SECTION NO. 4	Three inches of Type B asphalt surface over 2" of ¾" Concrete over 6" of 3"x ¾" [illegible], 3" emulsion treated base stone with double seal coat on the shoulders.
SECTION NO. 5	A double seal coat over 3" of asphalt emulsion treated chokestone over 6" of 3"x ¾" asphalt macadam (AEBM) and shoulder with 3" base stone.
SECTION NO. 6	A double seal coat over 3" of asphalt emulsion treated chokestone over 2" of ¾" Concrete over 6" of 3"x ¾" Mac. Shoulder to be 3" base stone.
SECTION NO. 7	A double seal coat over 3" of chokestone over 6" of 3"x ¾" macadam Prime coat required over chokestone before seal coat is applied.

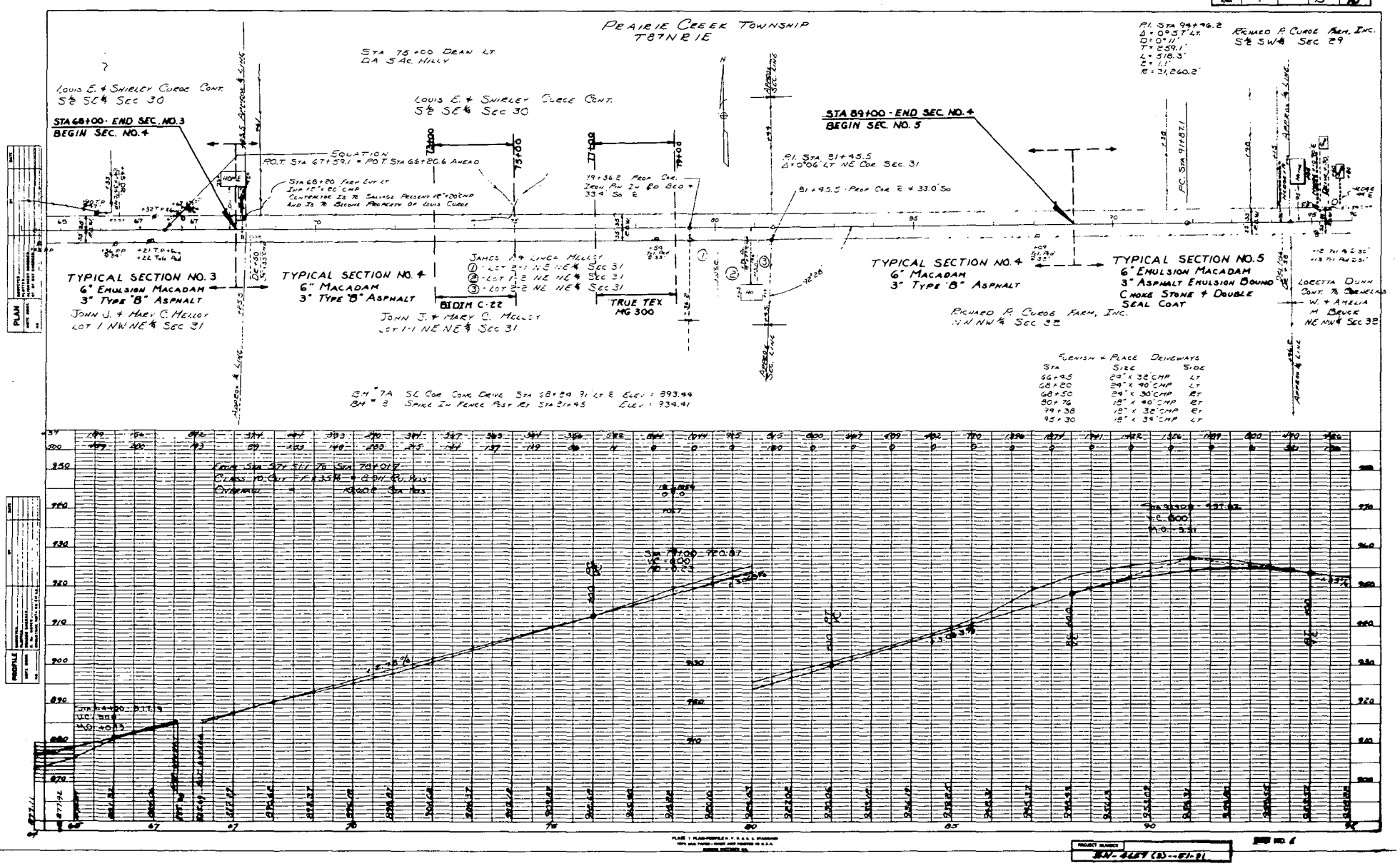
Typical sections No. 1 thru No. 7 shall extend into road intersections a minimum of 50' and include radius, and also shall extend into field and farm entrances a minimum of 10' and include radius.


PRAIRIE CREEK TOWNSHIP
T 87 N - R 1 E
STA 0+00 = 100 BEGIN CONSTRUCTION
STA. 3-59 - 30 AC. HILLY
4'-4'-125' R.C.B.
DROP INLET
U.A.C.
RAYMOND TURNIS
SW SE¼ SEC 19
STA 0+00 - 1+26.2 - BEGIN
TYPICAL SEC. NO. 1
STA 13+32 - APPROACH LANE "B" LT
DRY FILL
CONT. TO BUILD LANE IN ACCORDANCE
WITH GRADE LINE BELOW
SEE SHEET NO 59 FOR X SECTIONS
LORAINE KRAPFL & ESTATE
ALVIN J. KRAPFL
NW NE¼ SEC 30
TYPICAL SECTION NO. 1
6" BLACK BASE
2" TYPE "B"
8" SHOULDERS WITH
DOUBLE SEAL COAT
STA 13+00 RT
DRY FILL
Sta 14+75 RT
Omit
CARL KURT
Lot 2 SW Fec. ¼ SEC 19
CARL KURT
E½ NW Fec. ¼ SEC 30
BM "1A - X MARK ON SO. CONC. SHOULDER US "151, D.O.T.H.S.SOS+100 178' WEST OF ℄ STA 1+89.7 ELEV = 968.19
BM" 2 - SPIKE IN TEL POLE ON KRAPFL LANE LT STA 13+9.5 ELEV = 979.90
STA 1+89 - APPROACH ROAD "A" RT
CLASS 10 C+F 1535 B = 70 CU. YDS.
E.O.P STA 0+00
E.O.P STA 13+30 - 980.00
APPROACH LANE "B" LT.
PVI STA 0+00 - 979.30
VC = 400'
NO = 0.5
PVI STA 4+00 - 979.75
VC = 400'
NO = 1.25
PVI STA 13+00 - 979.65
VC = 400'
NO = 0.65
PVI STA 13+30 - 980.00
VC = 400'
NO = 0.75
STA 0+00 - 958.50
SHOULDER ES = 0.037
STA 0+00 - 971.30
SHOULDER ES = 0.037
STA 13+00 - 958.50
VC = 180'
NO = 1.29
STA 13+30 - 962.50
VC = 180'
NO = 0.89
TWO STRAND 12 X 20 CMP
FOR 18' X 38' CMP
INNER = 977.20 - 18' RT ℄
OUTER = 977.40 - 20' RT ℄
PLAN
PROFILE


PRAIRIE CREEK TOWNSHIP
T87N - R1E
LORAINE KRAPFL + ESTATE
ALVIN J KRAPFL
NW NE¼ SEC 30
LORAINE KRAPFL + ESTATE
ALVIN J KRAPFL
N½ LOT 3 SW NE¼ SEC 30
LORAINE KRAPFL + ESTATE
ALVIN J KRAPFL
LOT 2 SW NE¼ SEC. 30
LOUIS E. + SHIRLEY CURDE CONT.
LOT 1 SW NE¼ SEC 30 +
S½ LOT 3 SW NE¼ SEC 30
LOUIS E. + SHIRLEY CURDE CONT.
LOT 1 NW SE¼ SEC 30
STA 23+00 - END SEC. NO. 1
+ BEGIN SEC. NO. 2
PI STA 32+82.3 Δ=0°11' RT
STA 32+82.3 E LOCAL RD RT
SEE SHEET NO. 23 FOR APPROACH
ROAD "C" DETAILS
10+00
12+00
14+00
16+00
37+00
39+00
41+00
BIDIM
C-22
TRUE TEX
MG 300
TYPICAL SECTION NO.1
6" BLACK BASE
2" TYPE B"
8' SHOULDERS WITH
DOUBLE SEAL COAT
TYPICAL SECTION NO. 2
6" EMULSION TREATED MACADAM
2" TYPE "B" ASPHALT
SHOULDER MATERIAL WITH
DOUBLE SEAL COAT
CARL KURT
E½ NW FRC¼ SEC 3C
JOHN J + MARY E. MELLON
S½ SW¼ SEC 30
BM "2" - SPIKE IN TEL. POLE ON KRAPFL LANE LT. STA 13+45 - ELEV = 979.90
BM "10" - SPIKE IN TEL POLE STA 21+95 30' RT ℄ - ELEV = 939.20
BM "9" - IRON PIPE ON EAST FENCE LINE STA 32+36 - ELEV = 900.89
FURNISH + PLACE DRIVEWAYS
STA SIZE SIDE
29+00 18"X 32' CMP RT
28+00 36"X 36' CMP LT
PLAN
PROFILE
SN-A(170)--81-21


PRAIRIE CREEK TOWNSHIP
T87N R1E
BM "9" - IRON PIPE ON EAST FENCE LINE STA 32+30 ELEV = 900.89
BM "5A" - SPIKE IN PUB POLE STA 96+40 30' RT E ELEV = 872.02
BM "6A" - SPIKE IN PUB POLE STA 58+25 ON TANG 29' WEST ELEV = 870.96
LOUIS E. & SHIRLEY CUROE CONT.
LOT 1 NW SE¼ SEC 30
FURNISH & PLACE DRIVEWAYS
STA SIZE SIDE
42+85 18" X 32' CMP LT
96+15 18" X 36' CMP RT
53+85 18" X 39' CMP RT
69+95 24" X 32' CMP LT
STA 47+35
BEGIN SEC. NO. 3
TYPICAL SECTION NO. 2
6" EMULSION MACADAM
2" TYPE "B" ASPHALT
STA 47+05
END SEC. NO. 2
P.I. STA 32+82.3 L = C°11' RT
STA 32+82.3 ℄ LOCAL RD RT
SEE SHEET NO 19 FOR APPROACH ROAD "C" DETAILS.
TRUE TEX MG-300
BIDIM C-22
37+00
39+00
41+00
43+00
JOHN J. & MARY C. MELLOY
E½ SW¼ SEC 30.
TYPICAL SECTION NO. 3
6" EMULSION MACADAM
3" TYPE "B" ASPHALT
LOUIS E. & SHIRLEY CUROE CONT.
S½ SE¼ SEC 30.
STA 47+20 - INP 40'X21' I BEAM BRIDGE
D.A. = 1300 AC. ROLLING
THE BRIDGE CONTRACTOR IS TO REMOVE PRESENT STRUCTURE AND DISPOSE OF EXCEPT THE I-BEAM STRINGERS WHICH ARE TO BE REMOVED IN THERE ORIGINAL CONDITION AND BE STOCKPILED NEAR THE SITE, AND BECOME THE PROPERTY OF DUBUQUE COUNTY. THE BRIDGE CONTRACTOR IS TO CONSTRUCT 36'X30' CONCRETE SLAB BRIDGE
SEE SHEET No 66 FOR BRIDGE DETAILS
CURVE SUPERELEVATION - REFER TO STANDARD ROAD PLAN RP-1
STA 49+93 - BEGIN 8.0 TRANS. (NORMAL CROWN)
STA 50+09 - TRANS. INSIDE = 0.5 - OUTSIDE = 0.0
STA 50+65 - TRANS. INSIDE = 0.5 - OUTSIDE = 0.5
STA 50+23 BEGIN FULL SUPER - 8.0
SUPER ELEV = 8.0
P.I. STA 59+66.6
Δ = 89°35' LT
D = 7°
T = 812.6'
L = 1280.0'
S = 33.9°
R = 818.5'
STA 57+55 - INP 30'X18' PONY TRUSS
D.A. = 610 AC. ROLLING
THE GRADING CONTRACTOR IS TO REMOVE PRESENT STRUCTURE AND DISPOSE OF EXCEPT THE TRUSS WHICH ARE TO BE REMOVED IN THERE ORIGINAL CONDITION AND BE STOCKPILED NEAR THE SITE, AND BECOME THE PROPERTY OF DUBUQUE COUNTY.
STA 57+00 D.A. = 10 AC. ROLLING
F&P 24" X 68' CMP
16 GAUGE W.T. SEC. 2 APRONS
INLET ELEV = 869.50
OUTLET ELEV = 869.00
3.5% ℄ = 455' RT ℄
CLASS 65 EXCAV = 58 CU YDS
STA 57+50 ℄ COUNTY RD RT
SEE SHEET NO 23 FOR APPROACH ROAD "D" DETAILS
CURVE SUPERELEVATION - REFER TO STANDARD ROAD PLAN RP-1
STA 63+65 - END 8.0 FULL SUPER
STA 63+23 - TRANS. INSIDE = 0.5 OUTSIDE = 0.5
STA 63+59 - TRANS. INSIDE = 0.5 OUTSIDE = 0.0
STA 63+93 - END 8.0 TRANS (NORMAL CROWN)
STA 64+34.0 RT = 33' FROM ROW LINE 8.33+35'
JOHN J. & MARY C. MELLOY
LOT 1 NW NE¼ SEC. 31
STA 60+95 ON EAST TANGENT
2'X6'X27' R.C.B.
D.A. = 600 AC. ROLLING
CONTRACTOR IS TO REMOVE R.C.B. & DISPOSE OF.
ROBERT W. CUROE
NE NW ¼ SEC. 31
APRON SEE LINE ℄
ADT-1975 = 99 V.P.D.
Maintine Class 10 Cut = 33365 Cu. Yds
Canc Sta 37+32 Lt. Class 10 Cut = 2715 Cu. Yds
Approach Road "C" - Class 10 Cut = 4027 Cu. Yds - To Be Used On Maintine
Maintine Total Class 10 Cut = Fm 37+40 = 40107 Cu. Yds
Canc Sta 37+32 Lt. Class 10 Cut = Fm 37+40 = 978 Cu. Yds - To Be Done By Others
Total Class 10 Cut = 44,000 Cu. Yds
Sta 37+00 Bm 39
BC = 900
PC = 0.44
Sta 37+00 Bm 19
VC = 300
PC = 0.43
-0.39%
+1.20%
-0.60%
Special Ditch Rt + Lt
Special Ditch Rt + Lt
Special Ditch Lt
Special Ditch Lt
Sta 60+95 On Tang 2.0' From ℄
Sta 57+00 Bm 19
VC = 300
PC = 0.43
-0.39%
+0.82%
Sta 57+00 Bm 39
BC = 900
PC = 0.44
Total Class 10 Cut = 31,97 Cu. Yds
PROFILE
PLAN

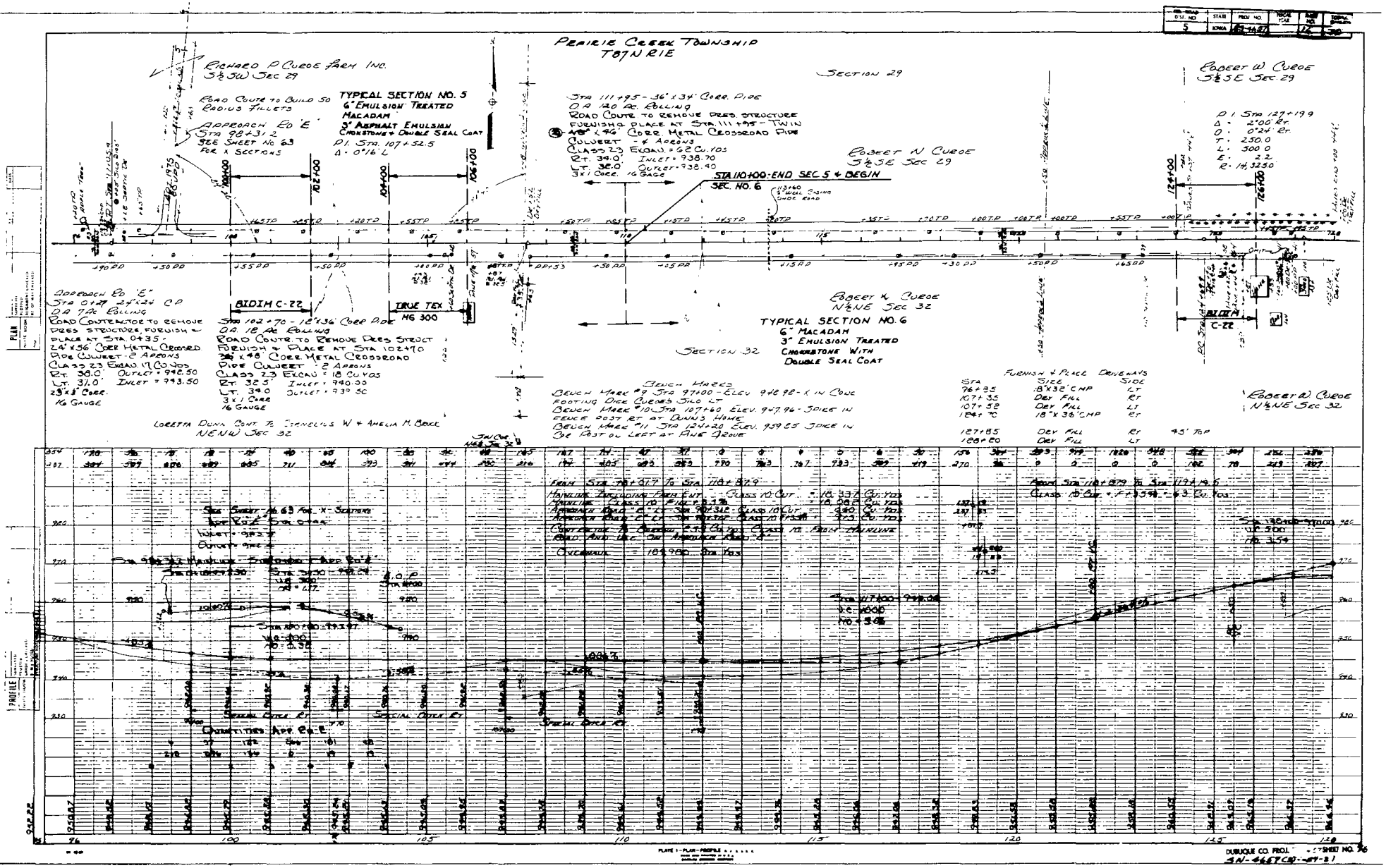
45

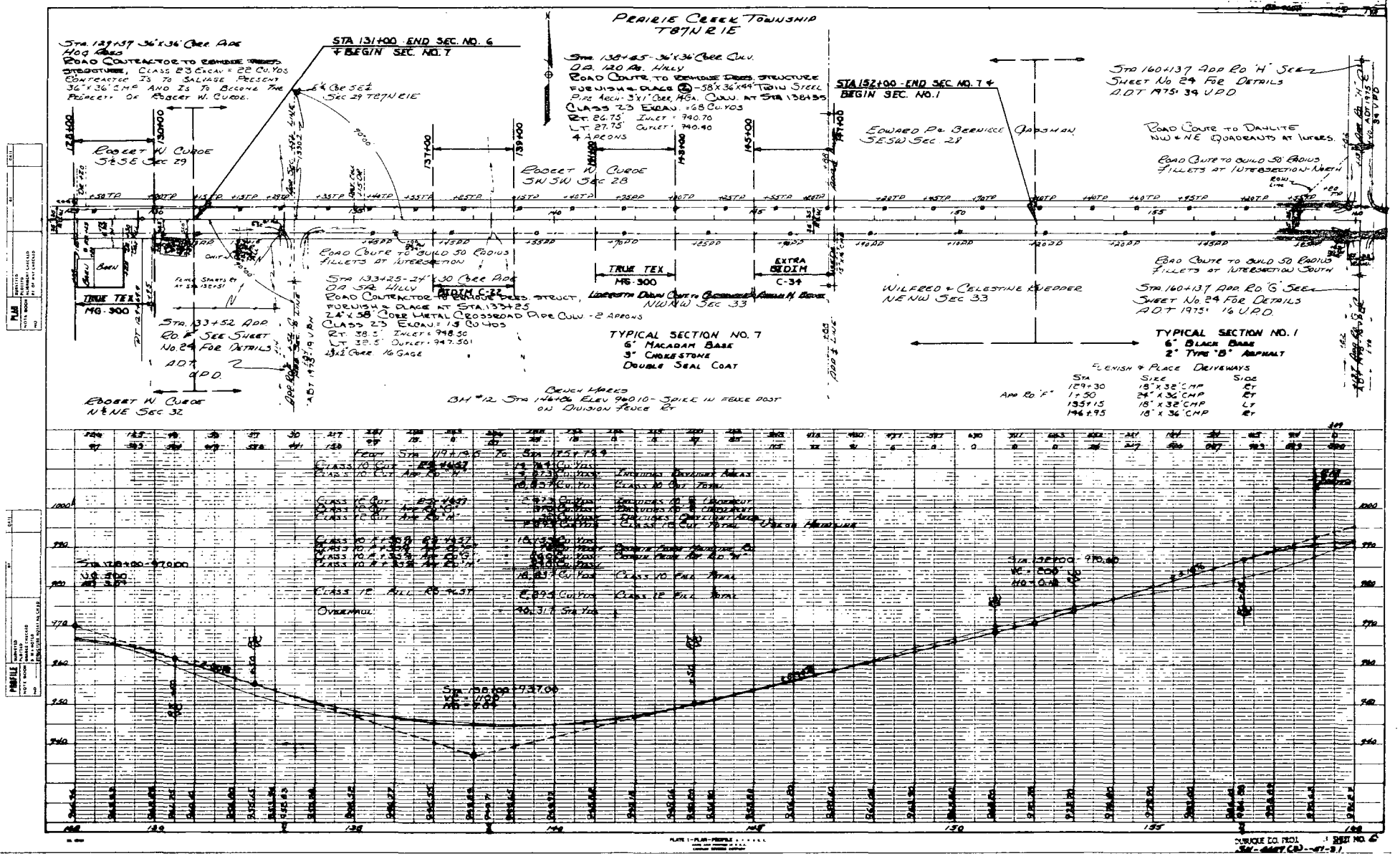


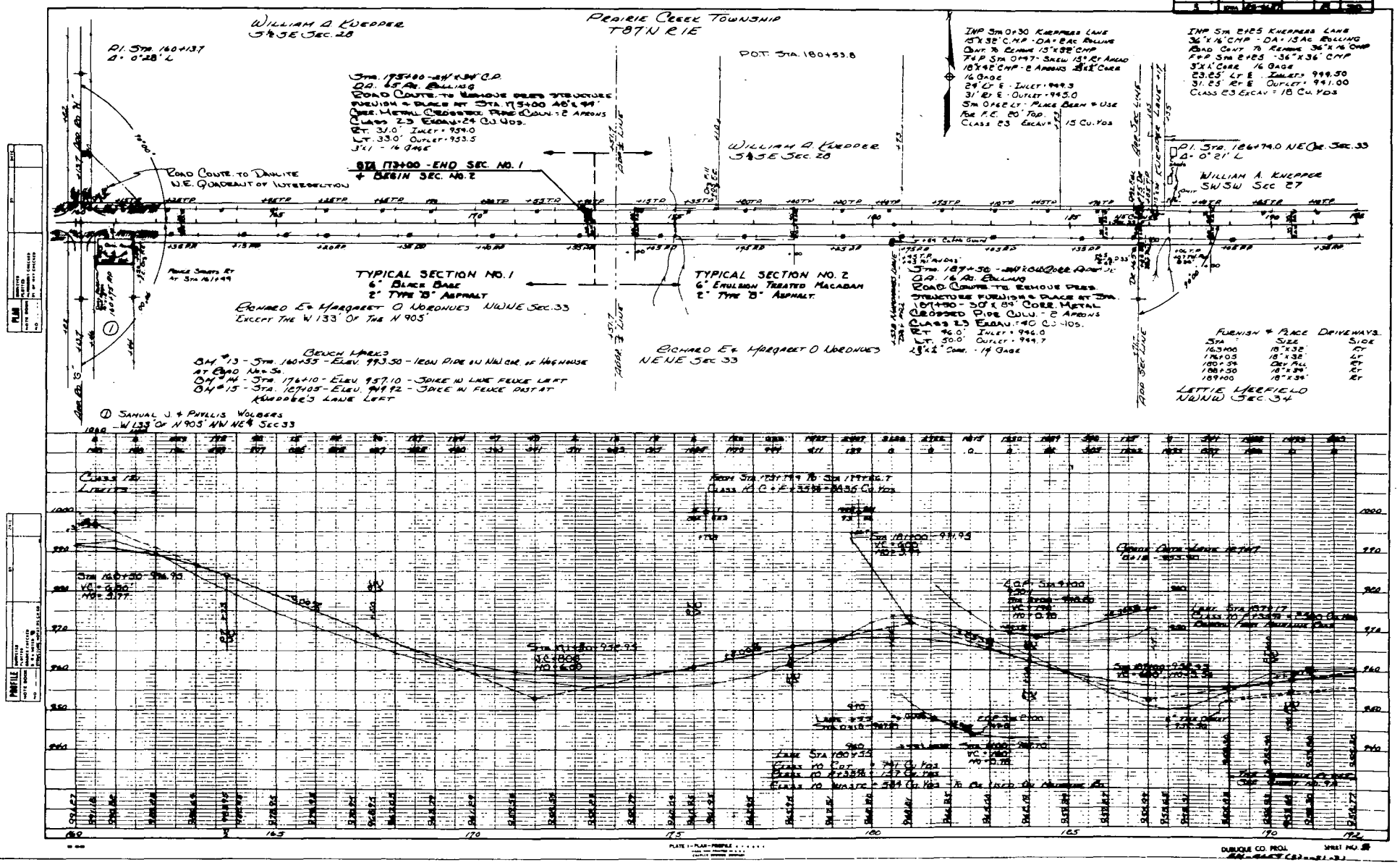
STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
IOWA	1		13	70

PROJECT NUMBER
BRV-ALLEY (13)--61-31

SHEET NO. 6


PRAIRIE CREEK TOWNSHIP
T87N R1E
SECTION 29
SECTION 32
RICHARD P CURDE FARM INC.
S½ SW SEC 29
ROBERT W CURDE
S½ SE SEC 29
ROBERT K CURDE
N½ NE SEC 32
TYPICAL SECTION NO. 5
6" EMULSION TREATED MACADAM
3" ASPHALT EMULSION CHOKESTONE + DOUBLE SEAL COAT
P.I. STA. 107+52.5
Δ = 0°16' L
ROAD COUTE TO BUILD 50 RADIUS FILLETS
APPROACH RD 'E' STA 98+31.2
SEE SHEET NO 63 FOR X SECTIONS
STA 111+95 - 36" X 34" CORR. PIPE
DA 120 AC. ROLLING
ROAD COUTE TO REMOVE PRES. STRUCTURE FURNISH & PLACE AT STA. 111+95 - TWIN 48" X 48" CORR METAL CROSSROAD PIPE CULVERT - 4 APRONS
CLASS 2.3 EXCAV = 62 CU. YDS
RT. 34.0' INLET = 938.70
LT. 32.0' OUTLET = 938.40
3 X 1 CORR. 16 GAGE
STA 110+00 - END SEC 5 & BEGIN SEC. NO. 6
P.I. STA 127+19.9
Δ = 2°00' RT.
D = 0°24' RT.
T = 250.0
L = 500.0
E = 2.2
R = 14,325.0
APPROACH RD 'E' STA 0+47 24'X24' CP
DA 7.2 AC ROLLING
ROAD COUTE TO REMOVE PRES STRUCT FURNISH & PLACE AT STA 0+35 - 24' X 36' CORR METAL CROSSROAD PIPE CULVERT - 2 APRONS
CLASS 2.3 EXCAV = 17.0 CU YDS
RT. 38.0' OUTLET = 996.50
LT. 31.0' INLET = 993.50
23'X3' CORR. 16 GAUGE
BIDIM C-22
TRUE TEX M6 300
STA 102+70 - 18"X36' CORR PIPE
DA 18 AC ROLLING
ROAD COUTE TO REMOVE PRES STRUCT FURNISH & PLACE AT STA 102+70
24' X 48' CORR METAL CROSSROAD PIPE CULVERT - 2 APRONS
CLASS 2.3 EXCAV = 18 CU YDS
RT. 32.5' INLET = 990.00
LT. 34.0 OUTLET = 989.50
3 X 1 CORR 16 GAUGE
LORETTA DUNN CONT TO CORNELIUS W & AMELIA M. BOKE NE¼NW SEC 32
BENCH MARKS
BENCH MARK #9 STA 97+00 - ELEV. 948.98 - X IN CONC FOOTING DIR CURVES SLO LT
BENCH MARK #10 STA 107+60 ELEV. 947.96 - SPIKE IN FENCE POST RT AT DUNN'S HOME
BENCH MARK #11 STA 124+20 ELEV. 959.65 SPIKE IN SW POST ON LEFT AT ANE GROVE
TYPICAL SECTION NO. 6
6" MACADAM
3" EMULSION TREATED CHOKESTONE WITH DOUBLE SEAL COAT
FURNISH & PLACE DRIVEWAYS
STA 96+35 SIZE 18"X32' CMP SIDE LT
107+35 DRY FILL RT
107+52 DRY FILL LT
124+70 18"X36' CMP RT
127+85 DRY FILL RT 45° TAP
128+60 DRY FILL LT
FROM STA 110+87.9 TO STA 111+87.9
HAULING EXCAVATION FROM EMT. - CLASS 10 CUT = 18.33 CU YDS
ROADWAY - CLASS 10 FILL = 18.08 CU YDS
APPROACH ROAD 'E' - LT. STA 0+27.34 - CLASS 10 CUT = 6.50 CU YDS
APPROACH ROAD 'E' - LT. STA 0+27.34 - CLASS 10 FILL = 7.53 CU YDS
CONSTRUCTION OF CULVERT = 2.53 CU YDS CLASS 10 FROM MAINLINE
ROAD AND USE OF APPROACH ROAD 'E'
CULVERTS = 18.990 TON TONS
FROM STA 110+87.9 TO STA 111+19.5
CLASS 10 CUT = 1.354 - 6.3 CU YDS
SEE SHEET NO 63 FOR X SECTIONS
APP. 'E' STA 0+47.24
INLET = 993.3'
OUTLET = 992.8'
Q = 23 CFS MANNING FORMULA EXCAVATED APP 'E'
STA 0+30 992.04
STA 0+00 991.54
SLOPE = 1.67%
STA 107+00 948.08
P.C. 106+00
PVI = 5.0%
STA 110+00 948.58
SPECIAL DITCH RT
SPECIAL DITCH LT
CULVERTS APP. 'E'
PLAN
PROFILE
PLATE 1 - PLAN - PROFILE
DUBUQUE CO. PROJ. - SHEET NO. 26
SN-4487(28)--39-31


PRAIRIE CREEK TOWNSHIP
T87N R1E
STA 131+00 END SEC. NO. 6
+ BEGIN SEC. NO. 7
STA 152+00 - END SEC NO. 7 +
BEGIN SEC. NO. 1
ROBERT W CUROE
S½SE SEC 29
ROBERT W CUROE
SW SW SEC 28
EDWARD P. & BERNIECE GARDNER
SESW SEC 28
WILFRED & CELESTINE KUEPPER
NE NW SEC 33
ROBERT W CUROE
NE NE SEC 32
TRUE TEX
MG-300
EXTRA
SEDIM
C-34
ARMCO C-32
BARN
TYPICAL SECTION NO. 7
6" MACADAM BASE
3" CHOKESTONE
DOUBLE SEAL COAT
TYPICAL SECTION NO. 1
6" BLACK BASE
2" TYPE "B" ASPHALT
FURNISH & PLACE DRIVEWAYS
Sta Size Side
129+30 18" x 32' CMP Rt
1+50 24" x 36' CMP Rt
135+15 18" x 32' CMP Lt
146+95 18" x 36' CMP Rt
ADD RD 'F'
ROAD CONTRACTOR TO REMOVE STRUCTURE, CLASS 23 EXCAV = 22 CU. YDS
CONTRACTOR IS TO SALVAGE PRESENT 36" x 36' CMP AND IS TO BECOME THE PROPERTY OF ROBERT W. CUROE.
STA 133+52 ADD RD 'F' SEE SHEET No. 24 FOR DETAILS
ADT 2
VPD.
STA 160+137 ADD RD 'H' SEE SHEET No. 24 FOR DETAILS
A.D.T. 1975: 34 VPD
STA 160+137 ADD RD 'G' SEE SHEET No. 24 FOR DETAILS
A.D.T. 1975: 16 VPD
ROAD CONTR TO DAHLITE NW & NE QUADRANTS AT INTERS.
ROAD CONTR TO BUILD 50' RADIUS FILLETS AT INTERSECTION - NORTH
ROAD CONTR TO BUILD 50 RADIUS FILLETS AT INTERSECTION
ROAD CONTR TO BUILD 50 RADIUS FILLETS AT INTERSECTION SOUTH
PRAIRIE CREEK TOWNSHIP
T87N R1E
STA 138+85 - 36" X 36' CMP CULV.
DA 120 AC. HILLY
ROAD CONTR TO REMOVE DEBRIS, STRUCTURE
FURNISH & PLACE (E) - 58" X 36" X 44' TRIPLE STEEL PIPE ARCH - 3" X 1" CORR. MGA. CULV. AT STA 138+35
CLASS 23 EXCAV. = 68 CU. YDS
RT. 26.75' INLET = 790.70
LT. 27.75' OUTLET = 790.40
4 APRONS
STA 133+25 - 24" X 30 CMP ADD
DA 58 AC. HILLY
ROAD CONTR TO REMOVE DEBRIS, STRUCT.,
FURNISH & PLACE AT STA 133+25
24" X 58' CORE METAL CROSSROAD PIPE CULV - 2 APRONS
CLASS 23 EXCAV = 19.80 YDS
RT. 38.5' INLET = 998.50
LT. 38.5' OUTLET = 997.30
16 GAGE
LOCATION DRIVE CUT TO GLENWOOD ACRES N. ADDN.
NW NW SEC 33
BENCH MARKS
BM #12 STA 146+00 ELEV 900.10 - SPIKE IN FENCE POST ON DIVISION FENCE Rt
Sta 129+30 - 917.00
VC = 500
HG = 3.6%
Sta 150+00 - 937.00
VC = 1000
HG = 2.0%
Sta 138+00 - 910.40
VC = 200
HG = 0.8%
PLAN
PROFILE
DUBUQUE CO. PROJ.
SHEET NO. 6
51


WILLIAM A. KNEPPER
S½SE Sec. 28
PRAIRIE CREEK TOWNSHIP
T87N R1E
P.I. Sta. 160+13.7
Δ - 0°28' L
P.O.T. Sta. 180+53.8
Sta. 173+00 -24" R.C.P.
Q.A. 15 Ac. Rolling
Road Contr. to Remove from Structure
Furnish & Place at Sta. 173+00 45°L 44'
Conc. Metal Crossed Pipe Culv. - 2 Aprons
Class 2.3 Excav. - 24 Cu. Yds.
Rt. 31.0' Inlet - 959.0
Lt. 33.0' Outlet - 953.5
3'x1' - 14 Gage
Road Contr. to Dinlite N.E. Quadrant of Intersection
STA 173+00 - END SEC. NO. 1
+ BEGIN SEC. NO. 2
Prairie Streets Rt. at Sta. 161+99
TYPICAL SECTION NO. 1
6" Black Base
2" Type 'B' Asphalt
TYPICAL SECTION NO. 2
6" Emulsion Treated Macadam
2" Type 'B' Asphalt
Richard & Margaret O Uhrenholt NW¼NE Sec. 33
Except the W 133' of the N 905'
Bench Mark 3
BM #13 - Sta. 160+55 - Elev. 993.50 - Iron Pipe on NW cor. of Highway at Road No. 56
BM #14 - Sta. 176+10 - Elev. 957.10 - Spike in Lane Fence Left
BM #15 - Sta. 167+05 - Elev. 949.92 - Spike in Fence Post at Knudsen's Lane Left
Richard & Margaret O Uhrenholt NE¼NE Sec. 33
INP Sta. 0+30 Knepper's Lane
15"x 32" C.M.P. - DA - 8 Ac. Rolling
Cont. To Remove 15"x 32" CMP
F&P Sta. 0+47 - Skew 15° Rt. Ahead
18"x 45" CMP - 2 Aprons 3½" Corr. 14 Gage
Sta. 0+69 Lt. - Place Barn & Use
For P.C. 80' Tod.
Class 23 Excav. - 15 Cu. Yds.
INP Sta. 2+25 Knepper's Lane
36"x 16" CMP - DA - 15 Ac. Rolling
Road Cont. To Remove 36"x 16" CMP
F&P Sta. 2+25 - 36"x 36" CMP
3"x 1" Corr. 14 Gage
23.25' Lt. & Rt. - Inverts 998.50
31.25' Rt. & Lt. - Outlet - 991.00
Class 23 Excav. - 18 Cu. Yds.
P.I. Sta. 186+74.0 NE Cor. Sec. 33
Δ - 0°21' L
William A. Knepper
SW¼SW Sec 27
Furnish & Place Driveways
Sta. | Size | Side
163+00 | 18"x 32" | Rt
178+05 | 18"x 32" | Lt
180+54 | Dbl. All | Rt
188+50 | 18"x 34" | Rt
189+00 | 18"x 34" | Rt
Lettie Weerfield
NW¼NW Sec. 34
① Samuel J. & Phyllis Wolbers
W 133' of N 905' NW¼NE¼ Sec 33
Class 10 Excav.
From Sta. 157+99 To Sta. 179+66.7
Class 10 C + F = 3556 = 3836 Cu. Yds.
Sta. 160+30 - 996.95
VC = 400
ND = 3.77
Sta. 171+00 - 939.93
VC = 800
ND = 6.00
Sta. 181+00 - 991.95
VC = 400
ND = 3.77
Lane Sta. 160+33
Class 10 Cut = 741 Cu. Yds.
Class 10 Fill = 1,221 Cu. Yds.
Class 10 Waste = 584 Cu. Yds.
To be used on Roadway Fill
Lane Sta. 178+17
Class 10 Excav. = 2,539 Cu. Yds.
Channel Change Approach Cuts
Channel Sta. 177+17
Class 10 Excav. = 2,539 Cu. Yds.
Channel Change Approach Cuts
Sta. 180+00 - 936.33
VC = 400
ND = 3.36
Sta. 181+00 - 937.33
VC = 400
ND = 3.77
Sta. 183+00 - 939.33
VC = 400
ND = 3.77
Sta. 184+00 - 940.33
VC = 400
ND = 3.77
Sta. 185+00 - 941.33
VC = 400
ND = 3.77
Sta. 186+00 - 942.33
VC = 400
ND = 3.77
Sta.

213+30

4111

U.S. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	IOWA	BR-4457		19	70

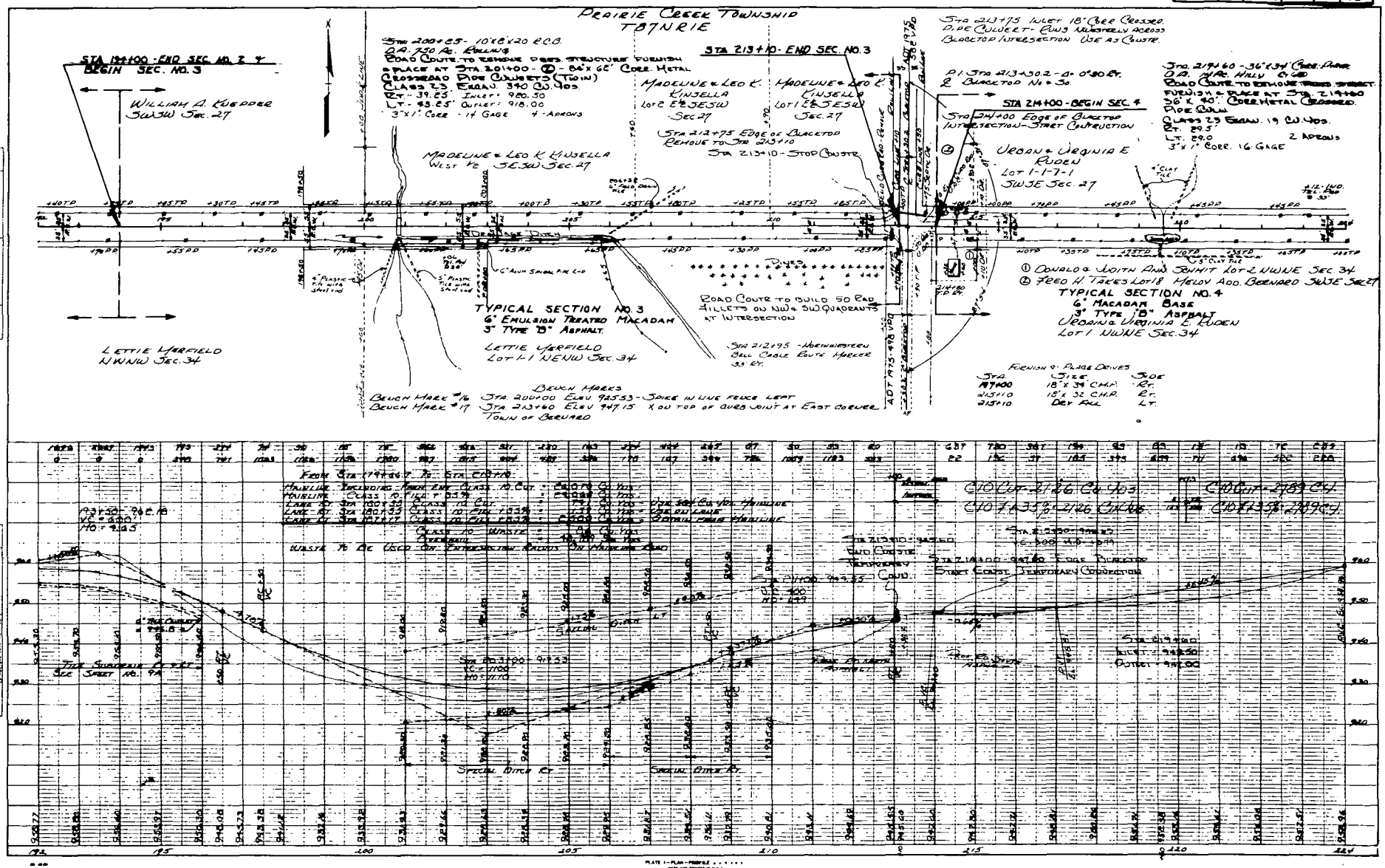
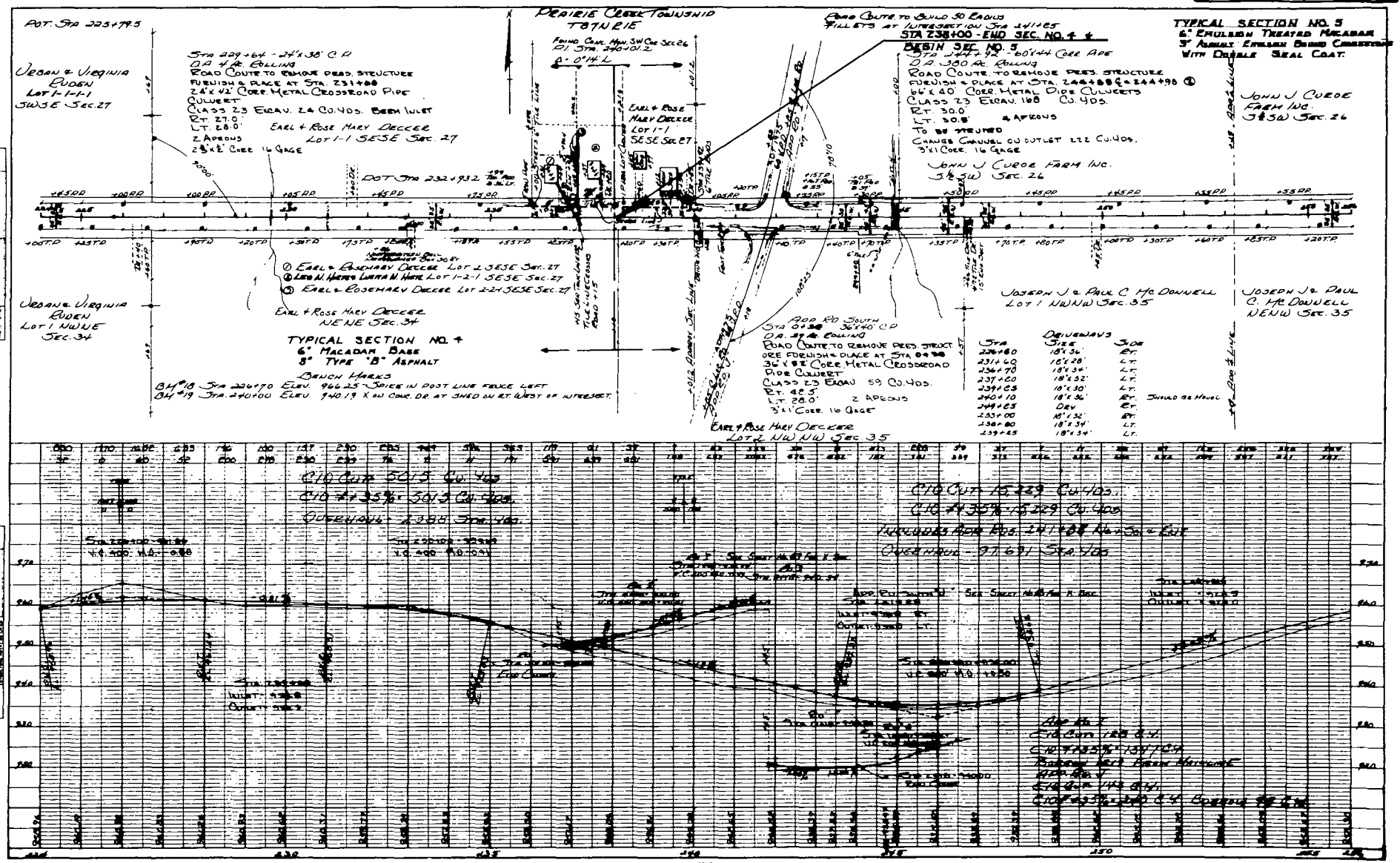


PLATE 1 - PLAN - PROFILE

DUBUQUE CO. PROJ. BR-4457--51-81 SHEET NO. 19


PRAIRIE CREEK TOWNSHIP
T 87 N R 11 E
TYPICAL SECTION NO. 5
6" EMULSION TREATED MACADAM
3" ASPHALT EMULSION BOUND CONCRETE
WITH DOUBLE SEAL COAT
STA 238+00 - END SEC. NO. 4
BEGIN SEC. NO. 5
TYPICAL SECTION NO. 4
6" MACADAM BASE
3" TYPE "B" ASPHALT
BENCH MARKS
JOHN J CUROE FARM INC.
JOSEPH J. & PAUL C. MC DONNELL
EARL & ROSE MARY DECKER
LOT 1-1 SESE SEC. 27
LOT 1 NWNW SEC. 35
NENE SEC. 34
DRIVEWAYS
SIZE
SLOPE
C10 CUTS 5013 CU. YDS.
C10 @ 35% 5013 CU. YDS.
OVERHAUL 2385 STA. YDS.
C10 CUTS 15,229 CU. YDS.
C10 @ 35% 15,229 CU. YDS.
OVERHAUL 97,691 STA. YDS.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	IOWA	FN-1457		87	70

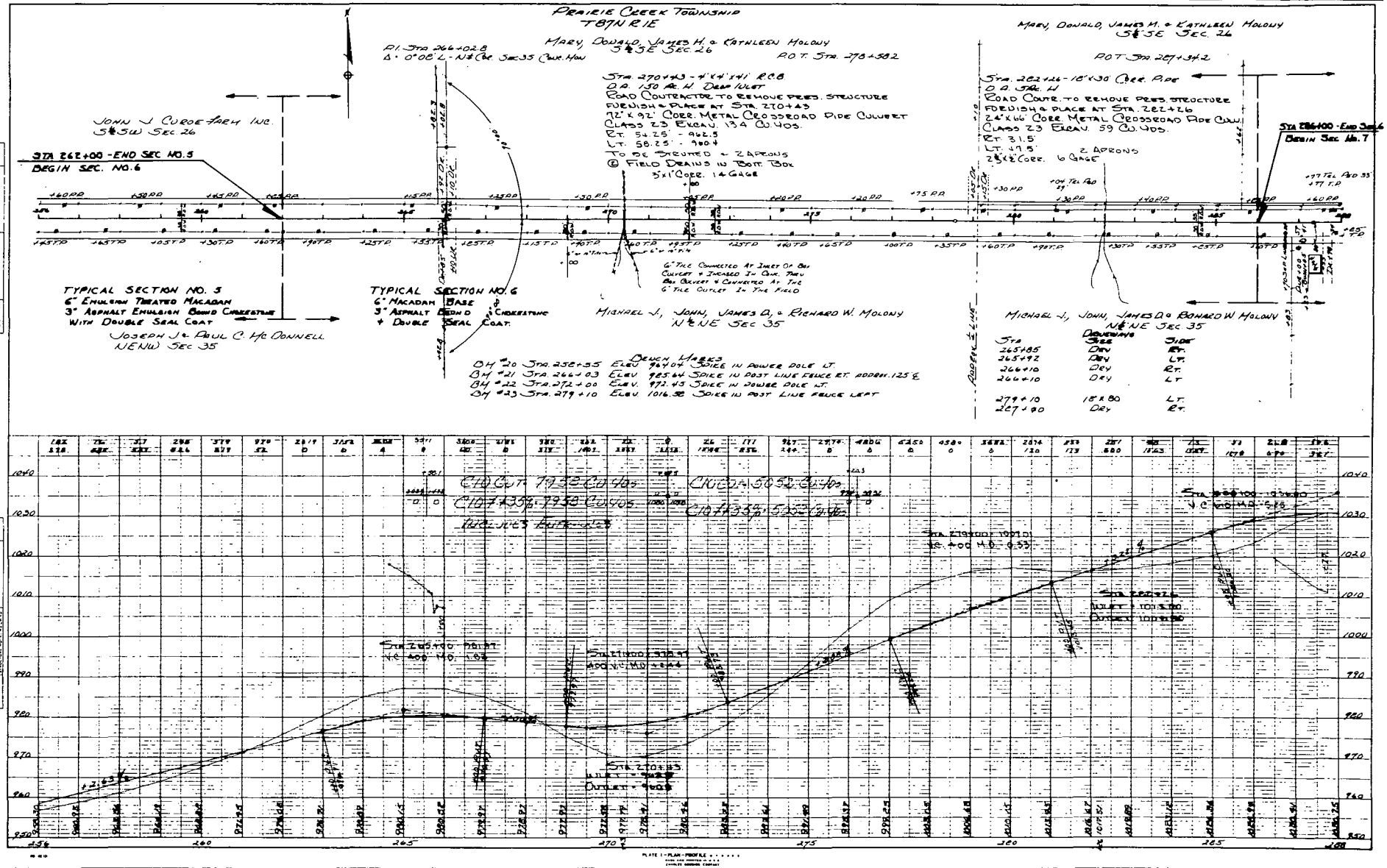
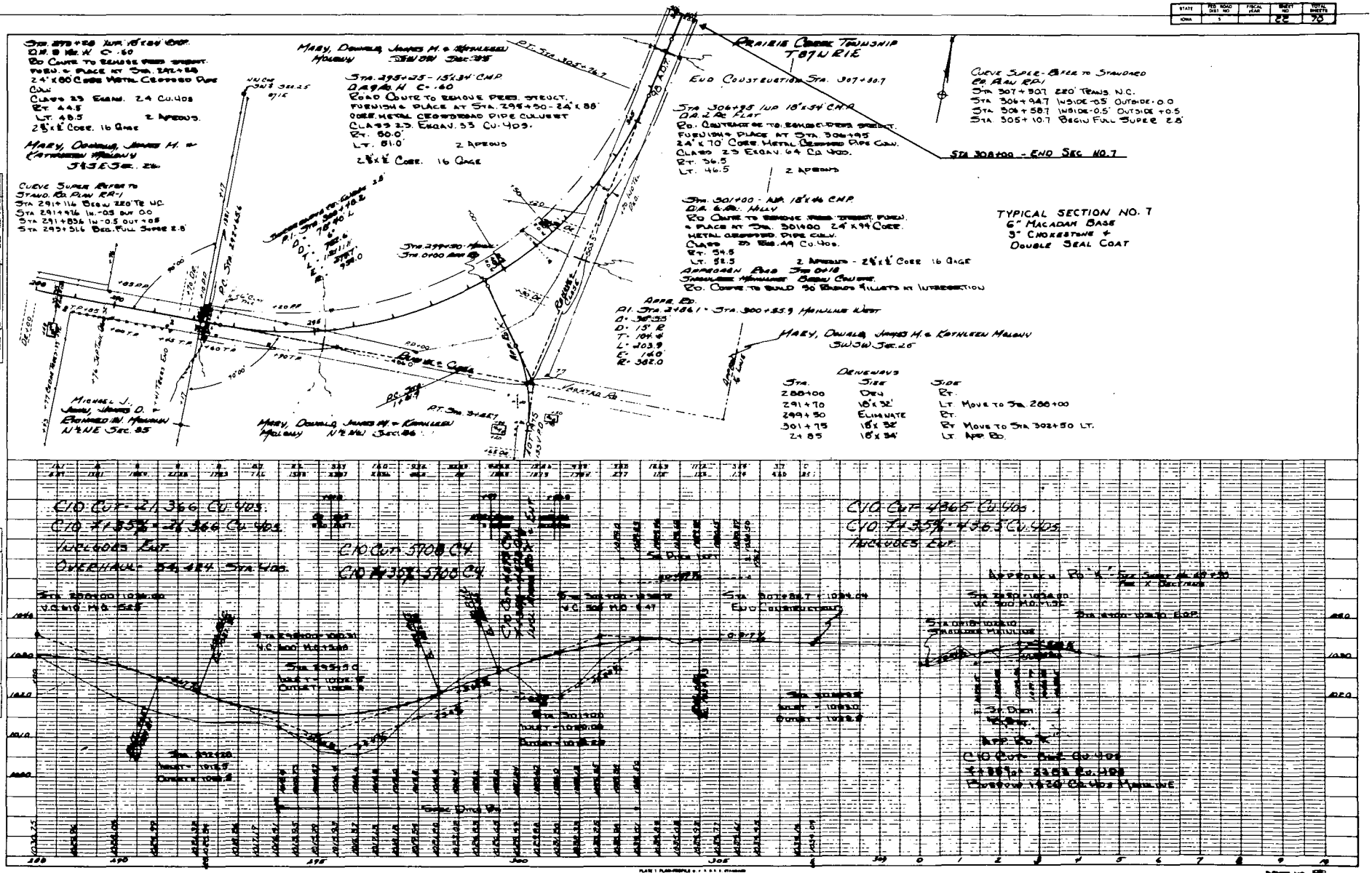


PLATE 1 - PLAN - PROFILE

DUBUQUE CO. PROJ. SHEET NO. 87

BM-4457(3)-57-31

59


PRAIRIE CREEK TOWNSHIP
T87N R1E
END CONSTRUCTION STA. 307+30.7
STA 308+00 - END SEC NO. 7
TYPICAL SECTION NO. 7
6" MACADAM BASE
3" CHOKESTONE +
DOUBLE SEAL COAT
MARY, DONALD, JAMES M. & KATHLEEN MALONY
SW¼SW¼ SEC. 25
MICHAEL J., JAMES D. & ELAINE M. MALONY
N½NE SEC. 35
C.I.O. CUT - 21,366 CU. YDS.
C.I.O. FILL - 21,366 CU. YDS.
HAUL 6085 FT.
OVERHAUL - 54,424 STA. YDS.
C.I.O. CUT - 4365 CU. YDS.
C.I.O. FILL - 4365 CU. YDS.
HAUL 6085 FT.
C.I.O. CUT - 3708 CY.
C.I.O. FILL - 3708 CY.
PROJECT NUMBER
SN-4607--57-31

61

STATE	FED. ROAD DIST. NO.	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
IOWA	6		63	70

BM "A" IRON PIPE ON EAST FENCE LINE STA 32+30 ELEV = 900.89

ROAD CONTRACTOR TO BUILD 50' RADIUS FILLETS AT INTERSECTION

SEE SHEET No. 60 FOR X SECTIONS

APPROACH RD 'C'
STA 0+00 - STA 32+82.3 MAINLINE

STA 0+18 - BEGIN CONSTRUCTION

JOHN J. & MARY C. MELLOY
E½ SW¼ SEC 30

STA 6+00 - END CONSTRUCTION

A.D.T. 1975 - 40 VPD

ROAD CONTRACTOR TO DAYLIGHT NW & SW QUADRANT AT INTERSECTION
EXCAVATE TO ELEV 895.00 - 5:1 BACKSLOPE

STA 0+30
D.A. = 5 AC. ROLLING
ROAD CONTRACTOR TO REMOVE PRES STRUCTURE
F&P AT STA 0+30 24" X 49" CORR. METAL CROSSROAD PIPE CULV. - 2 APRONS
CLASS 23 EXCAV. = 13 CU. YDS
RT = 38.5' INLET = 892.50
LT = 38.5' OUTLET = 891.80
23'x½" CORR 16 GAGE

CAREL KURT
E½ NW¼ EXC ¼ SEC 30

ONIT
STA 3+30 LT
INP 18"x26" C.M.P.

F&P STA 5+00 LT
DRY FILL

PRAIRIE CREEK TOWNSHIP
T87N-R1E

JOHN J. & MARY C. MELLOY
E½ SW¼ SEC 30

STA 1+50
F&P TWIN 78"x56" CORR. METAL CROSS ROAD PIPE - 4 APRONS
SECTN 15° LT AHEAD
3"x1" CORR., 16 GAGE
37.75' LT & INLET = 861.00
38.75' RT & OUTLET = 860.50
CLASS 23 EXCAV = 395 CU. YDS

PI STA 21.77
Δ = 47°42' LT
D = 14°
T = 180.9'
L = 340.7'
E = 38.2'
R = 409.3'

APPROX SEC. LINE

ROBERT W. CUROE
NE NW¼ SEC 31

BM "6A" - SPIKE IN PWR POLE STA 58+25 ON TANG 24' WEST ELEV = 870.96

APPROACH ROAD "D"
STA 0+00 - STA 57+50 MAINLINE
SEE SHEET No. 61 FOR X SECTIONS

ROAD CONTRACTOR TO BUILD 50' RADIUS FILLETS AT INTERSECTION

LOUIS E. & SHIRLEY CUROE CONT.
LOT 1 NW SE¼ SEC 30

HATCH AREA TO BE EXCAVATED BY ROAD CONTRACTOR IN ACCORDANCE WITH TYPICAL X SECTION. QUANTITIES TO BE DISPOSED OF IN OLD CHANNEL BED.

ABANDON EXIST. ROAD

PT STA 47+36.6

JOHN J. & MARY C. MELLOY
LOT 1 NW NE SEC 31

DRIVEWAYS
INP STA 3+35 LT - ONIT, F&P STA 3+80 LT 30"x 90' C.M.P.
INP STA 3+50 RT - F&P STA 3+50 RT 18"x 28' C.M.P.
INP STA 4+00 LT - ONIT.
INP STA 38+96 RT - ONIT, F&P STA 2+50 RT 18"x 40' C.M.P.
INP STA 60+85 LT - U.A.C.
INP STA 60+75 LT - U.A.C.

PLAN

PROFILE

CLASS 10 CUT = 3703 CU. YDS
FILL = 38 CU. YDS
3665 CU. YDS
NW¼ SW QUADRANT'S CLASS 10 CUT = 2400 CU. YDS
TO BE USED ON MAINLINE = 6027 CU. YDS

STA 31+60 903.74
VC = 300'
m = 3.24

STA 0+18 893.80
SHOULDER EL 893

STA 0+18 893.79
SHOULDER EL 893

CLASS 10 CUT = 8908 CU. YDS
CLASS 10 F&S = 2137 CU. YDS
CLASS 10 WASTE = 1451 CU. YDS
CLASS 10 - 451 CU. YDS TO BE USED FOR F.C. & MUSK DRIVE

CLASS 10 CHANNEL CUT = 110.0 CU. YDS
1100 CU. YDS TO BE SPREAD OUT IN OLD CHANNEL

STA 3+00 891.92
VC = 200'
m = 0.36

E.O.P. STA 3+00

CHANNEL CENTERLINE

TYPICAL CHANNEL X SECTION

PROJECT NUMBER
BRF-6507-51-21

SHEET NO. 63

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	IOWA	BR-4[illegible]		[illegible]	70

PRAIRIE CREEK TOWNSHIP
T87N R8E

APPROACH RD 'B' STA 0+00 - STA 133+52
MAINLINE SURVEY

STA. 0+18 BEGIN CONSTRUCTION
SEE SHEET NO. 64 FOR X SECTIONS
ROAD CONTRACTOR TO BUILD 50' RADIUS FILLETS

STA. 1+90 END CONSTRUCTION

WILLIAM J. DONN
NWNW SEC 33

ADT = 1975 19 VPD

ROBERT W. CURDE
NENE SEC. 32

STA 1+50 — DRIVEWAYS SIZE 24'X36' SIDE RT

BM "11 - STA 124+20 ELEV = 959.85 SPIKE IN OAK POST ON LEFT AT PINE GROVE

STA 0+00 - STA 160+137 MAINLINE

SEE SHEET NO. 65 FOR X SECTIONS
APPROACH RD 'H'
STA 0+18 BEGIN CONSTRUCTION
ROAD CONTRACTOR TO BUILD 50' RADIUS FILLETS

STA 3+00 APP RD 'H' END CONSTRUCTION

WILLIAM A. KNEPPER
S½SE SEC 28

ADT 1973 34 VPD

APP RD 'H'

APP ROAD 'H' FIELD ENT RT
STA 2+00 RT
F&P 18"X 32' CMP

ROAD CONTR. TO DAYLITE N.E., N.W. & S.W. QUADRANTS AT INTERSECT.

EDWARD P. & BERNICE GASSMAN
SESW SEC 28

BM "13 - STA 160+55 ELEV = 993.50 IRON PIPE ON COR OF HOGHOUSE AT ROAD NO. 30.

APPROACH RD 'G'
STA 0+18 - BEGIN CONSTRUCTION
SEE SHEET NO. 66 FOR X SECTIONS
ROAD CONTRACTOR TO BUILD 50' RADIUS FILLETS

SAMUAL J. & PHYLLIS WOLBERS
W 133' OF N 905' NWNE¼ SEC 33

ADT 1975 [illegible] VPD

APP RD 'G'

STA 4+00 END CONSTRUCTION

WILFRED & CELESTINE KNEPPER
NENW SEC. 33

DRIVEWAYS
STA 2+00 — SIZE 18"X30' CMP F.E.W. — SIDE LT

APPROACH ROAD 'A'
CLASS 10 F.A.S.[illegible] = 76 CU. YDS
CERTAIN ADJ. MAINLINE ROAD

STA 0+00 E.O.P.

STA 0+18 ± STA 0+60 CLASS 10 CORTE

STA 0+60 - 934.93
U.G. 80
M.H. +0.53

STA 1+00 E.O.P.

STA 160+137 MAINLINE
U.G. 800
M.H. +0.37
STA 0+00 = 992.80
PINE GROVE

STA 0+00 - 990.00
E.O.P.
ADJ. 60

APPROACH ROAD 'H'
CLASS 10 EMBK. CUT = 1632 CU. YDS
CLASS 10 EMBANKMENT CUT = 6987 CU. YDS
CLASS 10 EMBK. F.A.S.[illegible] = 378 CU. YDS
CLASS 12 EMBANKMENT CUT = 32 CU. YDS
TOTAL CLASS 10 WASTE = 5763 CU. YDS
TOTAL CLASS 12 WASTE = 32 CU. YDS

USE 260 CU. YDS CLASS 10 ON APPROACH ROAD 'G' SOUTH
USE 5763 CU. YDS CLASS 10 ON MAINLINE ROAD
USE 32 CU. YDS CLASS 12 ON MAINLINE ROAD

STA 0+00 - 995.00
U.G. 800
M.H. -0.58
STA 0+00 = 995.00
E.O.P.

APPROACH ROAD 'G' SOUTH
CLASS 12 EMBANKMENT = 310 CU. YDS
CLASS 10 FILL F.A.S.[illegible] = 260 CU. YDS
BORROW 260 CU. YDS CLASS 10 FROM APPROACH ROAD 'H'
USE 310 CU. YDS CLASS 12 ON MAINLINE ROAD

PLAN — INSPECTED, PLOTTED, CHECKED, NOTE BOOK, NO.

PROFILE — INSPECTED, PLOTTED, CHECKED, NOTE BOOK, NO.

PLATE 1 - PLAN - PROFILE

65

Appendix C

Test Reports

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: TYPE B CLASS 1 LAB NO. ABDO-128

INTENDED USE:

SIZE 3/4" SPEC. NO. DATE REPORTED 8-14-80

COUNTY DUBUQUE PROJECT SN-4657(3)--51-31

CONTRACTOR TSCHIGGFRIE

PROJ. LOCATION ON SEC. ROAD FROM U.S. 151 @ 25-87-1E S. AND E. 5.9 MILES

AGG. SOURCES 3/4" CR. LST.-MAR-JO HILLS QR.-DUBUQUE CO.; SAND-BELLEVUE-JACKSON CO.

JOB MIX FORMULA AGGREGATE PROPORTIONS: 70% AAT0-431; 30% AAT0-432

JOB MIX FORMULA - COMBINED GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
	100	99	90	80	62	47	37	26	14	8.0	5.5
TOLERANCE: 98/100		7	7	6			5				3

75 BLOW MARSHALL DENSITY		2.41	
ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 1190 POISES		
PLASTICITY INDEX	N.P.		
% ASPH. IN MIX	4.50	5.50	6.50
NUMBER OF MARSHALL BLOWS	50	50	50
MARSHALL STABILITY - LBS.	2858	2762	2490
FLOW - 0.01 IN.	7	8	12
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.35	2.38	2.40
BULK SP. GR. COMB. DRY AGG.	2.689	2.689	2.689
SP. GR. ASPH. @ 77 F.	1.029	1.029	1.029
CALC. SOLID SP.GR.	2.54	2.50	2.47
% VOIDS - CALC.	7.5	4.9	2.7
RICE SP. GR.	2.53	2.48	2.45
% VOIDS - RICE	7.0	4.0	2.0
% WATER ABSORPTION - AGGREGATE	1.17	1.17	1.17
% VOIDS IN THE MINERAL AGGREGATE	16.5	16.4	16.6
% V.M.A. FILLED WITH ASPHALT	54.4	69.9	83.9
CALCULATED ASPH.FILM THICKNESS(MICRONS)	6.8	8.6	10.4
FILLER/BITUMEN RATIO		0.9	

A CONTENT OF 6.0% ASPHALT IS RECOMMENDED TO START THE JOB.

COPIES:
ASPH. MIX DESIGN
SN-4657(3)--51-31, DUBUQUE
C. BAULE
R. HENELY
D. JORDISON
R. SHELQUIST
L. ZEARLEY
TSCHIGGFRIE
C. JONES
D. HINES

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: TYPE B CLASS I LAB NO. ABD0-129

INTENDED USE:

SIZE 3/4" SPEC. NO. 852-857 DATE REPORTED 8/18/80

COUNTY DUBUQUE PROJECT SN-4657(3)--51-31

CONTRACTOR TSCHIGGFRIE

PROJ. LOCATION ON SEC. RD. FROM U.S. 151 @ 25-87-1E S. AND E. 5.9 MILES

AGG. SOURCES 3/4" LST. CHIPS - MAR JO HILLS QR. - DUBUQUE CO.; 3/8" CR. LST. - MAR JO HILLS QR. - DUBUQUE CO.; SAND - BELLEVUE - JACKSON CO.
JOB MIX FORMULA AGGREGATE PROPORTIONS: 20% AAT0-433, 50% AAT0-434, 30% AAT0-423

JOB MIX FORMULA - COMBINED GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
	100	99	86	81	67	54	42	31	19	11	5.5
TOLERANCE: 98/100			7	7	6		5				3

75 BLOW MARSHALL DENSITY		2.43	
ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 1190 POISES		
PLASTICITY INDEX	N. P.		
% ASPH. IN MIX	4.50	5.50	6.50
NUMBER OF MARSHALL BLOWS	50	50	50
MARSHALL STABILITY - LBS.	2945	3000	2100
FLOW - 0.01 IN.	7	8	13
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.36	2.41	2.41
BULK SP. GR. COMB. DRY AGG.	2.726	2.726	2.726
SP. GR. ASPH. @ 77 F.	1.029	1.029	1.029
CALC. SOLID SP.GR.	2.56	2.52	2.48
% VOIDS - CALC.	7.8	4.4	2.9
RICE SP. GR.	2.55	2.50	2.46
% VOIDS - RICE	7.5	3.5	2.2
% WATER ABSORPTION - AGGREGATE	0.73	0.73	0.73
% VOIDS IN THE MINERAL AGGREGATE	17.3	16.4	17.3
% V.M.A. FILLED WITH ASPHALT	55.0	73.4	83.2
CALCULATED ASPH.FILM THICKNESS(MICRONS)	6.2	7.7	9.3
FILLER/BITUMEN RATIO		1.0	

A CONTENT OF 5.75% ASPHALT IS RECOMMENDED TO START THE JOB.

COPIES:
ASPH. MIX DESIGN
SN-4657(3)--51-31, DUBUQUE
R. C. HENELY
C. BAULE
D. JORDISON
R. SHELQUIST
L. ZEARLEY
TSCHIGGFRIE
C. JONES
D. HINES

SIGNED: BERNARD C. BROWN

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: A.T.B. CLASS 2 LAB NO. ABD0-135

INTENDED USE:

SIZE 3/4" SPEC. NO. 852-857 DATE REPORTED 8-18-80

COUNTY DUBUQUE PROJECT SN-4657(3)--51-31

CONTRACTOR TSCHIGGFRIE

PROJ. LOCATION ON SEC. RD. FROM U.S. 151 @ 25-87-1E SOUTH & EAST 5.9 MILES

AGG. SOURCES 3/4" CR. LST.-MAR JO HILLS QR.-DUBUQUE CO.; SAND-BELLEVUE-JACKSON CO.

JOB MIX FORMULA AGGREGATE PROPORTIONS: 70% AAT0-431; 30% AAT0-432

JOB MIX FORMULA - COMBINED GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
	100	99	90	80	62	47	37	26	14	8.0	5.5
TOLERANCE: 98/100			7	7	6		5				3

ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 1190 POISES	
PLASTICITY INDEX		
% ASPH. IN MIX	4.50	5.50
NUMBER OF MARSHALL BLOWS	50	50
MARSHALL STABILITY - LBS.	2858	2762
FLOW - 0.01 IN.	7	8
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.35	2.38
BULK SP. GR. COMB. DRY AGG.	2.689	2.689
SP. GR. ASPH. @ 77 F.	1.029	1.029
CALC. SOLID SP.GR.	2.54	2.50
% VOIDS - CALC.	7.5	4.9
RICE SP. GR.	2.53	2.48
% VOIDS - RICE	7.0	40
% WATER ABSORPTION - AGGREGATE	1.17	1.17
% VOIDS IN THE MINERAL AGGREGATE	16.5	16.4
% V.M.A. FILLED WITH ASPHALT	54.4	69.9
CALCULATED ASPH.FILM THICKNESS(MICRONS)	6.8	8.6
VOIDS/BITUMEN INDEX RATIO	5.4	2.8

A CONTENT OF 4.50% ASPHALT IS RECOMMENDED FOR THE JOB.

COPIES:
ASPH. MIX DESIGN
SN-4657(3)--51-31, DUBUQUE
BAULE
R. HENELY
D. JORDISON
R. SHELQUIST
L. ZEARLEY
TSCHIGGFRIE
C. JONES
D. HINES

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: A.T.B. CLASS 2 LAB NO. ABD0-136

INTENDED USE:

SIZE 3/4" SPEC. NO. 852-857 DATE REPORTED 8/18/80

COUNTY DUBUQUE PROJECT SN-4657(3)--51-31

CONTRACTOR TSCHIGGFRIE

PROJ. LOCATION ON SEC. RD. FROM U.S. 151 @ 25-87-1E S. AND E. 5.9 MILES

AGG. SOURCES 3/4" LST. CHIPS - MAR JO HILLS QR. - DUBUQUE CO.; 3/8" CR. LST. - MAR JO HILLS QR. - DUBUQUE CO.; SAND - BELLEVUE - JACKSON CO.
JOB MIX FORMULA AGGREGATE PROPORTIONS: 20% AAT0-433, 50% AAT0-434, 30% AAT0-423

JOB MIX FORMULA - COMBINED GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
	100	99	86	81	67	54	42	31	19	11	5.5
TOLERANCE:	98/100		7	7	6		5				3

ASPHALT SOURCE AND APPROXIMATE VISCOSITY	KOCH - 1190 POISES	
PLASTICITY INDEX		
% ASPH. IN MIX	4.50	5.50
NUMBER OF MARSHALL BLOWS	50	50
MARSHALL STABILITY - LBS.	2945	3000
FLOW - 0.01 IN.	7	8
SP.GR. BY DISPLACEMENT(LAB DENS.)	2.36	2.41
BULK SP. GR. COMB. DRY AGG.	2.726	2.726
SP. GR. ASPH. @ 77 F.	1.029	1.029
CALC. SOLID SP.GR.	2.56	2.52
% VOIDS - CALC.	7.8	4.4
RICE SP. GR.	2.55	2.50
% VOIDS - RICE	7.5	3.5
% WATER ABSORPTION - AGGREGATE	0.73	0.73
% VOIDS IN THE MINERAL AGGREGATE	17.3	16.4
% V.M.A. FILLED WITH ASPHALT	55.0	73.4
CALCULATED ASPH.FILM THICKNESS(MICRONS)	6.2	7.7
VOIDS/BITUMEN INDEX RATIO	6.2	2.7

A CONTENT OF 4.75% ASPHALT IS RECOMMENDED FOR THE JOB.

COPIES:
ASPH. MIX DESIGN
SN-4657(3)--51-31, DUBUQUE
R. C. HENELY
C. BAULE
D. JORDISON
R. SHELQUIST
L. ZEARLEY
TSCHIGGFRIE
C. JONES
D. HINES

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT- - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL 3" MACADAM LAB NO. AAR0-276

INTENDED USE EMULSION TREATED MACADAM

COUNTY DUBUQUE PROJ NO. SN-4657(3)--51-31

DESIGN CONTRACT NO.

PRODUCER BEECHER STONE CONTRACTOR TSCHIGGFRIE

SOURCE BERNARD

UNIT OF MATERIAL SAMPLED FROM STOCKPILE AT QUARRY CONTRACT QUANTITY

SAMPLED BY J. LAMANTIA SENDERS' NO. CR0AS-170

DATE SAMPLED J. LAMANTIA REC'D 9-19-80 REPORTED 9-30-80

% PSG. #8 AFTER 25 CYCLES, F&T, WATER SOL.	1
% WEAR, LA ABRASION, GRADING B	40

COPIES:
ROAD STONE
R. C. HENELY
C. BAULE
SN-4657(3)--51-31
GEOLOGY

DISPOSITION: PROPERTIES TESTED COMPLY

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT- - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL 3/4" CRUSHED STONE — LAB NO. AAT0-544

INTENDED USE TYPE B ASPHALT

COUNTY — PROJ NO. SN-4657(3)--51-31

DESIGN — CONTRACT NO.

PRODUCER TSCHIGGFRIE — CONTRACTOR TSCHIGGFRIE

SOURCE DUBUQUE

UNIT OF MATERIAL SAMPLED FROM STOCKPILE AT PROD. PLANT — CONTRACT QTY.

SAMPLED BY J. LAMANTIA — SENDERS' NO. CR0AS-165

DATE SAMPLED 9-8-80 — REC'D 9-19-80 — REPORTED 9-30-80

% PSG, #8 AFTER 16 CYCLES, F&T, WATER-ALC. SOL.	1
% PSG, #8 AFTER 25 CYCLES, F&T, WATER SOL.	1
% WEAR, LA ABRASION, GRADING B	30
LIQUID LIMIT	16
PLASTIC LIMIT	16
PLASTICITY INDEX	0

COPIES:
BIT. AGG.
R. C. HENELY
C. BAULE
~~SN-4657(3)--51-31~~, DUBUQUE
GEOLOGY

DISPOSITION: PROPERTIES TESTED COMPLY

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL ASPHALT AC-10 LAB NO. AB0-220

INTENDED USE TYPE B ASPHALT

COUNTY DUBUQUE PROJ NO. SN-4657(3)--51-31

DESIGN CONTRACT NO.

PRODUCER KOCH CONTRACTOR TSCHIGGFRIE

SOURCE DUBUQUE TERMINAL

UNIT OF MATERIAL SAMPLE AT ASPHALT PLANT. CONTRACT QUANTITY

SAMPLED BY JOHN LAMANTIA SENDER'S NO. CR0AS-167

DATE SAMPLED 9/9/80 REC'D 9/29/80 REPORTED 10/1/80

SPECIFIC GRAVITY AT 60 F/60 F.	
SOFT. POINT: METHOD (R & B)	
PENETRATION AT 77 F. 100 GMS. 5 SEC.	102
FLASH POINT	
SOLUBLE IN TRICHLOROETHYLENE	99.69%
DUCTILITY AT 77 F.	
SPOT TEST	
THIN FILM LOSS ON HEATING 5 HRS AT 325 F.	0.54%
% ORIGINAL PENETRATION (THIN FILM RES.)	50
PENETRATION OF RES. AT 77 F. 100 GMS. 5 SEC.	51
DUCTILITY AT 77 F. (THIN FILM RES.)	125+ CMS.
ABSOLUTE VISCOSITY ORIGINAL 140 F. 30 CM HG	1190 POISES
ABSOLUTE VISCOSITY THIN FILM RES. 140 F. 30 CM HG	3550 POISES
KIN. VISCOSITY ORIGINAL @ 275 F.	

COPIES:
ASPHALT
R. C. HENELY
C. BAULE
SN-4657(3)--51-31, DUBUQUE

DISPOSITION: COMPLIES WITH AASHTO M226

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL MC-70 LAB NO. AR00-100

INTENDED USE PRIME & TACK

COUNTY DUBUQUE PROJ NO. SN-4657(3)--51-31

DESIGN CONTRACT NO.

PRODUCER KOCH CONTRACTOR TSCHIGGFRIE

SOURCE DUBUQUE

UNIT OF MATERIAL SAMPLED FROM DISTRIBUTOR ON PROJECT CONTRACT QUANTITY

SAMPLED BY J. LAMANTIA SENDER'S NO. CR0AS-168

DATE SAMPLED 9-9-80 REC'D 9-29-80 REPORTED 10-2-80

SP. GR. @ 60 F./ 60 F.	0.9547
FLASH POINT - OPEN CUP	
KINEMATIC VISCOSITY, CENTISTOKES, @ 140 F.	130
DISTILLATION % BY VOL. TOTAL DISTILLATE TO 680 F.	
IB.P.	388
374 F.	0.0%
437 F.	6.1%
500 F.	45.4%
600 F.	84.8%
RESIDUE BY VOL. ABOVE 680 F.	67.0
RESIDUE BY WEIGHT ABOVE 680 F.	72.9%
WATER	NIL %
RESIDUE FROM	DISTILLATION
PENETRATION @ 77 F. 100 GMS. 5 SEC.	187
DUCTILITY @ 77 F., CM.	
SOLUBLE IN TRICHLOROETHYLENE	
ABSOLUTE VISCOSITY AT 140 F. 300 MM HG, POISES	614

COPIES:
ROAD OIL
R. C. HENELY
C. BAULE
SN-4657(3)--51-31, DUBUQUE

DISPOSITION: COMPLIES WITH AASHTO M-82

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
AMES LABORATORY
TEST REPORT - BITUMINOUS MATERIALS

MATERIAL 3/4" ASPHALT MIX — LAB NO ABC0-336
INTENDED USE TYPE 'B' SURFACE 5.75%
PROJECT NO SN-4657(3)--51-31 — COUNTY DUBUQUE
CONTRACTOR TSCHIGGFRIE
PRODUCER TSCHIGGFRIE — CONTRACT NO
PLANT DUBUQUE
UNIT OF MATERIAL SAMPLED ON PROJ. CONTRACT QUANTITY
SENDERS NO CR0AS-166
SAMPLED BY J. LAMANTIA
DATE SAMPLED 9-9-80 DATE RECD 9-26-80 DATE REPORTED 10-7-80

SIEVE ANALYSIS PERCENT PASSING

SIEVE	GM.RET	% RET	% PSG
1-1/2	0.0	0.00	0.00
1.05	0.0	0.00	0.00
3/4	0.0	0.00	100.00
1/2	212.0	13.39	86.61
3/8	155.5	9.83	76.78
4	184.5	11.66	65.12
8	208.0	13.14	51.98
16	162.5	10.27	41.71
30	154.5	9.76	31.95
50	202.5	12.79	19.16
100	113.0	7.13	12.03
200	73.5	4.64	7.39
WASH	91.0	7.39	0.00
PAN	26.0	0.00	0.00

DRY WT. 1584.000
SUM OF RETAINED WTS. 1583.000

% AGGREGATE BY EXTRACTION	94.600
% BITUMEN BY EXTRACTION	5.400
SPECIFIC GRAVITY	2.410
MARSHALL STABILITY	3567.000
MARSHALL FLOW 0.01 IN.	8.000

COPIES TO:

ASPH. CONC.
R. C. HENELY
C. BAULE
SN-4657(3)--51-31, DUBUQUE

BY BERNARD C. BROWN
TESTING ENGINEER

ASSURANCE SAMPLE

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT- - MISCELLANEOUS MATERIALS
LAB LOCATION AMES

MATERIAL HFMS-2 EMULSION LAB NO. ARE0-141

INTENDED USE EMULSION TREATED MACADAM

COUNTY DUBUQUE PROJ NO. SN-4657(3)--51-31

DESIGN CONTRACT NO.

PRODUCER KOCH CONTRACTOR TSCHIGGFRIE

SOURCE

UNIT OF MATERIAL SAMPLED FROM TANK AT BERNARD PLANT. CONTRACT QUANTITY

SAMPLED BY J. LAMANTIA SENDERS' NO. CR0AS-71

DATE SAMPLED 9/9/80 REC'D 10/6/80 REPORTED 10/8/80

VISCOSITY, SAYBOLT FUROL AT 77 F. (SEC.)	124
WT./GAL. LBS.	8.39
ASPHALT CONTENT, % BY WEIGHT	67.1
PENETRATION OF RESIDUE AT 77 F. 100 GMS. 5 SEC.	167

COPIES:
EMULSION
R. C. HENELY
C. BAULE
~~SN-~~4657(3)--51-31, DUBUQUE

DISPOSITION: COMPLIES

SIGNED: BERNARD C. BROWN
TESTING ENGINEER

IOWA DEPARTMENT OF TRANSPORTATION
Materials Department
AMES LABORATORY

ROAD ROUGHNESS REPORT

Lab. No. RR 0-154 Report Date 11-13-80 County Dubuque

Proj. Miles _____ Year Built 1980 Road No. _____

Contractor Tschiggfrie Excav. Proj. No. SN-4657(3)-51-31

Location Near the W¼ Cor. Sec. SE ¼ Asph. Conc. X A.C. Resur. _____
P.C. Conc. _____ Slip Form _____
Fixed Form _____

Sec. 19-87-1E South & East to SW Cor Sec. 25-87-1E

Date Tested 11-5-80 Weather Clear

Test Observers McCauley - Frette

1/4 Pt E Bound Lane W Bound Lane

Terminus	Sect. No.	Length (Miles)	Roughness Inches/Mile	Roughness Inches/Mile
Start 20 Rev. S ℄ Ia. 151 Omit Bridge	1	1.00	80	86
~~———~~	~~2~~	~~1.00~~	~~86~~	~~82~~
~~———~~	~~3~~	~~1.00~~	~~83~~	~~95~~
~~Stop End AC~~	~~4~~	~~0.27~~	~~1.00~~	~~126~~
C. Huisman B. Brown K. McLaughlin D. Jordison B. Shelquist C. L. Baule Tschiggfrie Excav.				
Miles Measured	~~3.27~~		Ave. ~~84~~	Ave. 91

B. C. Brown
Testing Engineer

DH

C. Huisman
B. Brown
K. McLaughlin
R. Shelquist
D. Jordison
B. Henely
R. Merritt
C. L. Baule

Form 8-8/1022
R-77

Test Method No. Iowa 1002-C
August 1977

Iowa Department of Transportation
Office of Materials

RMRV REPORT

Road No. _____ County Dubuque Lab Report No. 8125

Year Built 1980 Date Tested 11-5-80 Date Reported 11-14-80

Contractor Tschiggfrie Excavating Project No. SN-4657(3)-51-31

Project Length (miles) _____ Surface Type AC Resurf

Location From US 151 near the W ¼ corner SE¼ Section 19-87-1E South and East to just east of the SW Corner Section 25-87-1E

Weather Clear Wind _____ Temperature _____

Test Personnel Jones

	S Outside Bound Lane	N Outside Bound Lane
Length Tested	3.063	3.066
Longitudinal Profile Value	3.775	3.775
Average Longitudinal Profile Value		3.78
Deduction for Cracking, Patching and Rut Depth		0
Present Serviceability		3.78

Testing Engineer

9-2-

Appendix D

Contract Copy

CONTRACT

TYPE OF WORK ASPH. CEMENT CONC. PAV'T. PROJECT NO. SN-4657(3)--51-31

MILES 5.855 COST CENTER 801000 OBJECT 860

COUNTY DUBUQUE

ON SECONDARY ROAD FROM U S 151, NEAR THE W 1/4 COR. SE 1/4 SEC. 19-87-1E, SOUTH AND EAST TO JUST EAST OF THE SW COR. SEC. 25-87-1E

THIS AGREEMENT MADE AND ENTERED BY AND BETWEEN THE COUNTY OF DUBUQUE, IOWA

PARTY OF THE FIRST PART, AND

TSCHIGGFRIE EXCAVATING CO. OF DUBUQUE, IOWA 44990

PARTY OF THE SECOND PART.

WITNESSETH, THAT THE PARTY OF THE SECOND PART, FOR AND IN CONSIDERATION OF $ ****897,023.10, PAYABLE AS SET FORTH IN THE SPECIFICATIONS CONSTITUTING A PART OF THIS CONTRACT, HEREBY AGREES TO CONSTRUCT VARIOUS ITEMS OF WORK AND, OR, TO SUPPLY VARIOUS MATERIALS OR SUPPLIES IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS THEREFOR, AND IN THE LOCATIONS DESIGNATED IN THE NOTICE TO BIDDERS, AS FOLLOWS:

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	INCLUDES 7 SECTIONS WITH DESIGN VARIATIONS				
1	BASE, TYPE B CLASS 1 ASPHALT CEMENT CONCRETE	6,815	TONS	15.25	103,928.75
2	BASE, ASPHALT TREATED, CLASS 2	4,370	TONS	14.25	62,272.50
3	ASPHALT CEMENT	589	TONS	145.00	85,405.00
4	STABILIZED SHOULDER MATERIAL	6,455	TONS	8.00	51,640.00
5	AGGREGATE, ROADWAY COVER, 1/2 IN.	2,064	TONS	11.00	22,704.00
6	BINDER BITUMEN	48,761	GALS.	.75	36,570.75
7	PRIMER OR TACK-COAT BITUMEN	24,995	GALS.	.80	19,996.00
8	BASE, MACADAM STONE - EMULSION TREATED	15,850	TONS	7.72	122,362.00
9	BASE, MACADAM STONE	16,040	TONS	6.72	107,788.80
10	BASE, CHOKE STONE - EMULSION TREATED	4,067	TONS	7.00	28,469.00
11	BASE, CHOKE STONE	6,628	TONS	7.00	46,396.00
12	EMULSION, TREATED BASE MATERIAL	283,095	GALS.	.74	209,490.30
				GRAND TOTAL	$897,023.10

PARTY OF THE SECOND PART CERTIFIES BY HIS SIGNATURE ON THIS CONTRACT, UNDER PAIN OF PENALTIES FOR FALSE CERTIFICATION, THAT HE HAS COMPLIED WITH 324.17(8) OF THE 1975 CODE OF IOWA AS AMENDED, IF APPLICABLE

SAID SPECIFICATIONS AND PLANS ARE HEREBY MADE A PART OF AND THE BASIS OF THIS AGREEMENT, AND A TRUE COPY OF SAID PLANS AND SPECIFICATIONS IS NOW ON FILE IN THE OFFICE OF THE PARTY OF THE FIRST PART UNDER DATE OF JULY 10, 1980

THAT IN CONSIDERATION OF THE FOREGOING, THE PARTY OF THE FIRST PART HEREBY AGREES TO PAY THE PARTY OF THE SECOND PART, PROMPTLY AND ACCORDING TO THE REQUIREMENTS OF THE SPECIFICATIONS THE AMOUNTS SET FORTH, SUBJECT TO THE CONDITIONS AS SET FORTH IN THE SPECIFICATIONS.

THE PARTIES HERETO AGREE THAT THE NOTICE AND INSTRUCTIONS TO BIDDERS, THE PROPOSAL FILED HEREIN, THE GENERAL SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION FOR 1977 TOGETHER WITH SPECIAL PROVISIONS ATTACHED, TOGETHER WITH THE GENERAL AND DETAILED PLANS, IF ANY, FOR SAID PROJECT SN-4657(3)--51-31, TOGETHER WITH SECOND PARTY'S PERFORMANCE BOND, ARE MADE A PART HEREOF, AND TOGETHER WITH THIS INSTRUMENT CONSTITUTE THE CONTRACT BETWEEN THE PARTIES HERETO.

THAT IT IS FURTHER UNDERSTOOD AND AGREED BY THE PARTIES OF THIS CONTRACT THAT THE ABOVE WORK SHALL BE COMMENCED OR COMPLETED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

APPROX. OR SPECIFIED STARTING DATE OR NUMBER OF WORKING DAYS	SPECIFIED COMPLETION DATE OR NUMBER OF WORKING DAYS
APPROX JULY 30,1980	40 WORKING DAYS

THAT TIME IS THE ESSENCE OF THIS CONTRACT AND THAT SAID CONTRACT CONTAINS ALL OF THE TERMS AND CONDITIONS AGREED UPON BY THE PARTIES HERETO.

IN WITNESS WHEREOF THE PARTIES HERETO HAVE SET THEIR HANDS FOR THE PURPOSE HEREIN EXPRESSED TO THIS AND THREE OTHER IDENTICAL INSTRUMENTS AS OF THE _____ DAY OF _____, 19____

COUNTY OF DUBUQUE, IOWA

BY _____
PARTY OF THE FIRST PART

TSCHIGGFRIE EXCAVATING CO. OF DUBUQUE, IOWA

BY _____
PARTY OF THE SECOND PART

Approved:

_____ JUL 31 1980
Contracts Engineer Date
IOWA DEPT. OF TRANSPORTATION

Appendix E

Road Rater Data

TABLE I

STRUCTURAL RATING BASED ON ROAD RATER

Section #	Station from-to	Initial Structural Rating on Sub Base	Final Structural Rating on Pavement in Place
1	0 to 23+00	1.4	3.6
2	23+00 to 47+05	1.9	3.1
3	47+35 to 68+00	1.7	3.2
4	68+00 to 89+00	2.3	2.3
5	89+00 to 110+00	2.0	2.35
6	110+00 to 131+00	2.0	1.9
7	131+00 to 152+00	1.9	1.9
8-14	152+00 to 308+00	1.8	2.0

Using Table II* (on following page)
for comparison basis

Section Number 1 (0.34) (6) + 0.44 (2) = 2.92

6" black base 2" of Type B surface 2.04 + 0.88 = 2.92 SN versus 3.6 final

Section Number 7 (0.12) (6) + (0.14) (3) = 1.14

0.72 + 0.42 = 1.14 SN versus 1.9 final

From all indications, the Type B asphaltic concrete over the 6" black base and the 6" emulsion bound macadam base are the best sections - Sections 1, 2, and 3. However, the spring will bring some changes to the pavements and as the summer approaches, deflection readings may decrease in Sections 4, 5, and 6. No substantial increase in structural characteristics is expected in section 7.

*Howard B. McPhail, Guide for Primary and Interstate Road Pavement Design, Iowa Department of Transportation, Ames 1968.

TABLE II

Component	Coefficient	Minimum Thickness Permitted
Surface Course		
Type A Asphalt Cement Concrete	0.44*	3 (300 tpd)
Type B Asphalt Cement Concrete	0.44*	2 (300 tpd)
Type B Asphalt Cement Concrete Class 2	0.40	
Inverted Penetration	0.20	
Base Course		
Type A Binder Placed as Base	0.40	
Type B Asphalt Cement Concrete Base Class I	0.38	2
Type B Asphalt Cement Concrete Base Class II	0.30	2
Asphalt Treated Base Class I	0.34*	4
Bituminous Treated Aggregate Base	0.23	6
Asphalt Treated Base Class II	0.26	4
Cold-Laid Bituminous Concrete Base	0.23	6
Cement Treated Granular (Aggregate) Base	0.20*	6
Soil-Cement Base	0.15	6
Crushed (Graded) Stone Base ***	0.14*	6
Macadam Stone Base	0.12	6
Portland Cement Concrete Base (New)	0.50	
Old Portland Cement Concrete	0.40**	
Subbase Course		
Soil-Cement Subbase	0.10	6
Soil-Lime Subbase	0.10	6
Granular Subbase	0.10*	4
Soil-Aggregate Subbase	0.05*	4

*Indicates coefficients taken from AASHTO Interim Guide for the Design of Flexible Pavement Structures.

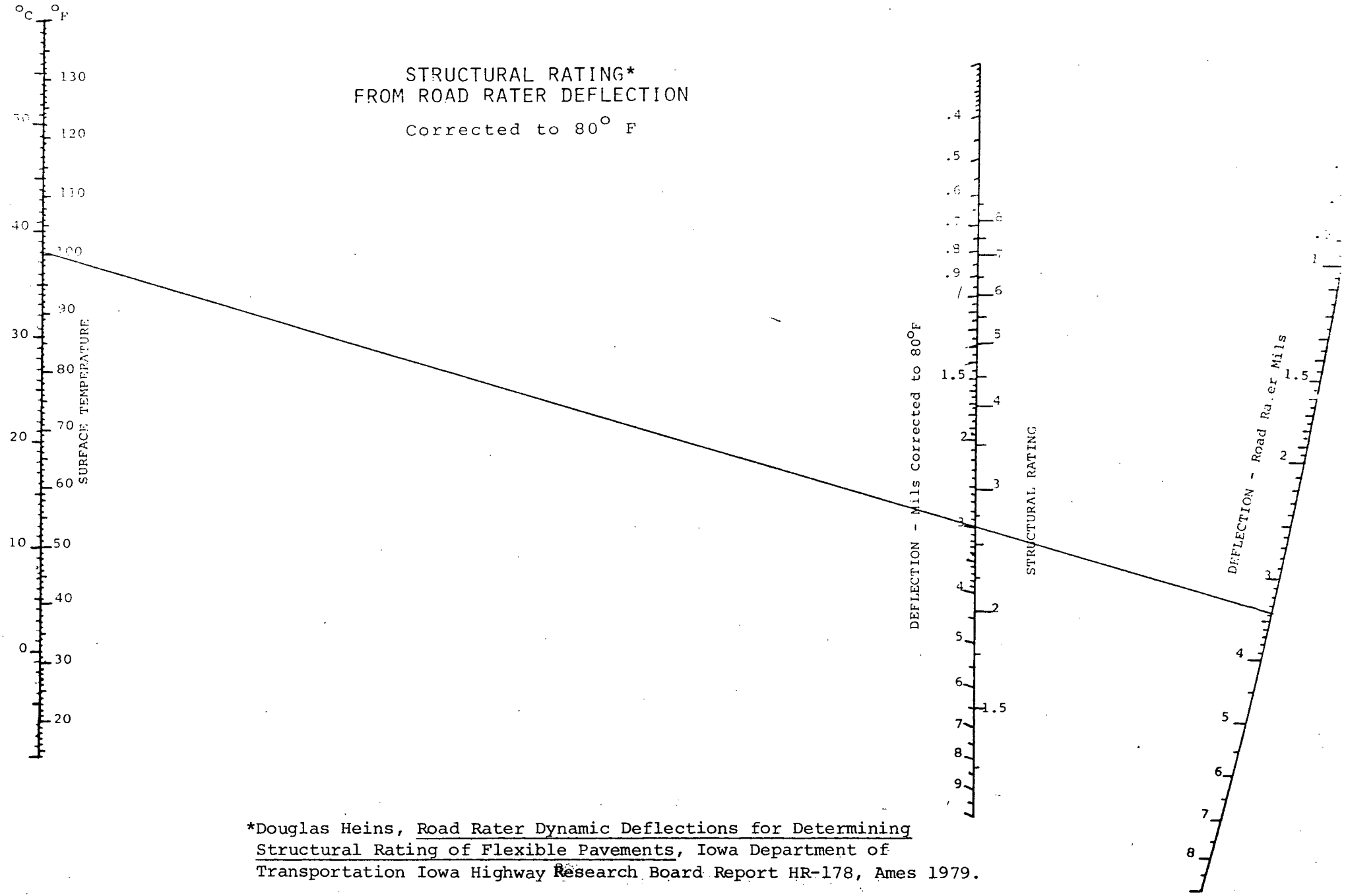
**This value is for reasonably sound existing concrete. Actual value used may be lower, depending on the amount of deterioration that has occurred.

***No current specification.

Revised 8/30/77

STRUCTURAL RATING*
FROM ROAD RATER DEFLECTION

Corrected to 80° F



*Douglas Heins, Road Rater Dynamic Deflections for Determining Structural Rating of Flexible Pavements, Iowa Department of Transportation Iowa Highway Research Board Report HR-178, Ames 1979.

$\frac{1000}{5280} = \frac{x}{100} \Rightarrow x = 18.94$

PROGRAM NUMBER- FEEE0050
COMPUTER RUN DATE- 08/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D05B
PAVEMENT TYPE..

BEGINNING MP.... 0.0
ENDING MP..... 23.00
COMPUTED MILES.. 23.00

LAB NO..... RR1-1022
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH &TRITSCH
TIME... 13:20

+23

0 Counts = Rear wheels against pavement at MP 451

2.22

3.2

NG-32

ROAD RATER DEFLECTION (MILS)

		EASTBOUND			WESTBOUND		
	M-P	SENS 1 ↓	SENS 2	SENS 1 ↓	SENS 2	REMARKS
118	95 5.000 5720	4.60	2.20	3.00	1.45	
181	~~168~~ 5.500 5654	3.55	2.15	7.60	4.40	Average temperature
193	6.000 5645	3.75	2.10	4.50	2.20	72°
202	6.500 5635	3.50	1.90	5.50	2.20	
221	7.000 5616	3.00	1.50	5.50	2.60	
230	7.500 5607	3.45	2.15	5.10	2.70	
240	8.000 5597	7.20	3.40	6.70	2.70	
260	8.500 5578	4.80	2.65	6.90	2.70	
269	9.000 5569	5.00	2.20	7.10	2.70	
279	9.500 5559	5.00	3.80	6.20	3.40	
298	10.000 5540	4.65	2.25	6.20	3.00	
307	10.500 5531	6.30	2.80	5.10	2.90	
316	11.000 5521	5.60	2.80	7.40	3.90	
335	11.500 5502	7.00	2.10	4.90	1.75	
344	12.000 5493	4.50	1.55	5.40	1.40	
354	12.500 5483	5.70	1.90	4.50	1.60	

06

* * * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * HISTORY * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 Design 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	1.26	7.20	3.00	4.85	5.91	2.34	2.51	0.517
WEST	1.24	7.60	3.00	5.72	6.77	2.60	3.12	0.546
COMB	1.31	~~7.20~~ 7.60	3.00	5.29	6.39	2.47	2.62	0.533

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

1.4

PROGRAM NUMBER- P2220050 OFFICE OF MATERIALS
COMPUTER RUN DATE- 24/02/80 ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 23.00
ENDING MP..... 47.50
COMPUTED MILES.. 24.50

LAB NO..... RR1-1023
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER
OBS.... SMITH & TRITSCH
TIME... 13:30

ROAD RATER DEFLECTION (MILS)

23-456

	M-P	EASTBOUND SENS 1	EASTBOUND SENS 2	WESTBOUND SENS 1	WESTBOUND SENS 2	REMARKS
478	24.000	5359	5.30	1.70	4.70	1.00	
593	30.000	5244	4.20	1.70	5.40	2.40	Average temperature 72°
697	35.500	5139	3.25	1.60	3.50	1.10	
716	36.000	5130	3.85	1.75	3.05	1.55	
727	36.500	5120	2.75	1.50	3.20	1.40	
734	37.500	5101	3.65	2.00	2.60	1.30	
745	38.000	5091	3.80	1.40	3.25	1.20	
755	38.500	5081	4.40	1.80	3.70	1.50	
774	38.500	5062	3.45	1.30	3.50	1.45	
783	39.000	5053	3.55	1.60	3.60	1.40	
792	40.500	5043	3.20	1.60	2.61	1.32	
812	41.500	5024	2.65	1.25	3.70	1.60	
822	42.000	5015	3.00	1.30	3.30	1.55	
831	42.500	5005	2.95	1.25	3.40	1.60	
851	43.500	4986	4.60	1.60	3.85	1.60	
860	44.000	4977	4.80	1.60	3.45	1.50	
869	44.500	4967	4.70	1.45	3.50	1.50	

91

SUMMARY OF DATA

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.79	5.30	2.65	3.77	4.43	1.55	2.22	0.588
WEST	0.66	5.40	2.61	3.56	4.11	1.47	2.09	0.587
COMB	0.72	5.30	2.61	3.66	4.27	1.51	2.15	0.588

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

478 1.9

PROGRAM NUMBER- P222E05C
COMPUTER RUN DATE- 99/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 47.35
ENDING MP..... 68.00
COMPUTED MILES.. 20.65

LAB NO..... RR1-1024
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 13:40

ROAD RATER DEFLECTION (MILS)

	EASTBOUND			WESTBOUND		
	M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
1039	53.500 4796	3.35	1.55	4.30	1.50	SECH SECL
1049	54.000 4787	3.95	1.90	5.60	1.80	SECH SECL
1059	54.500 4777	3.60	1.50	5.00	1.60	SECH SECL
1078	55.500 4758	3.80	1.65	3.95	1.65	SECH SECL
1087	56.000 4749	4.55	2.25	4.60	2.05	SECH SECL
1097	56.500 4739	5.00	2.50	5.00	2.90	SECH SECL
1116	57.500 4720	6.80	2.20	4.15	2.35	SECH SECL
1126	58.000 4711	4.20	1.70	6.30	2.70	SECH SECL
1136	58.500 4701	3.55	2.00	5.20	3.20	SECH SECL
1155	59.500 4682	2.95	1.70	3.20	2.10	SECH SECL
1164	60.000 4673	5.10	2.40	4.90	2.90	SECH SECL
1174	60.500 4663	5.20	2.20	5.50	2.90	SECH SECL
1193	61.500 4644	4.70	2.20	3.15	1.60	SECH SECL
1202	62.000 4635	3.75	1.85	3.60	2.00	SECH SECL
1212	62.500 4625	4.75	1.65	3.85	1.90	SECH SECL
1297	67.000 4540	3.40	1.45			

Average temperature 72°

* * * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * * * HISTORY * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.96	6.80	2.95	4.29	5.10	1.92	2.37	0.553
WEST	0.92	6.30	3.15	4.55	5.32	2.22	2.33	0.512
COMB	0.93	6.80	2.95	4.42	5.20	2.07	2.35	0.532

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

92

1.7

PROGRAM NUMBER- P222C05C
COMPUTER RUN DATE- 10/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 67.00
ENDING MP..... 89.00
COMPUTED MILES.. 22.00

LAB NO..... RR1-1025
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 13:50

Take sta times 19
add 52
after sta 67+59

ROAD RATER DEFLECTION (MILS)

	EASTBOUND M-P	SENS 1	SENS 2	WESTBOUND SENS 1	SENS 2	REMARKS
1297	67.000 4540			2.52	1.20	
1432 1409	71.500 4428	4.70	1.70	3.80	1.30	Average temperature
1418	72.000 4419	3.85	1.60	3.60	1.35	72°
1427	73.500 4409	3.95	1.00	2.58	1.02	
1448	74.000 4390	2.55	0.90	2.82	1.05	
1458	74.500 4381	3.00	1.25	3.75	1.65	
1467	75.000 4371	2.90	1.00	2.70	1.02	
1487	75.500 4352	2.90	1.35	2.85	1.30	
1496	76.000 4343	3.90	1.75	3.50	1.90	
1506	76.500 4333	2.28	0.93	2.52	0.96	
1525	77.500 4314	2.46	0.87	3.20	0.50	
1534	78.000 4305	2.07	0.90	2.70	0.84	
1547	78.500 4295	2.65	1.25	2.64	0.60	
1563	79.500 4276	3.05	1.10	3.25	1.15	
1572	80.000 4267	2.31	1.11	2.22	1.14	
1582	80.500 4257	2.22	1.08	2.75	1.00	

93

SUMMARY OF DATA

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.73	4.70	2.07	2.92	3.53	1.19	1.73	0.594
WEST	0.49	3.80	2.22	2.96	3.37	1.12	1.84	0.621
COMB	0.61	4.70	2.07	2.94	3.45	1.15	1.79	0.608

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

2.3

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 21/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 89.00
ENDING MP..... 110.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1026
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 14:00

ROAD RATER DEFLECTION (MILS)

	EASTBOUND			WESTBOUND		
	M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
176	90.000 4076	3.60	2.30	3.60	2.00	
192	98.500 3914	2.90	1.65	3.75	1.45	
193	99.000 3905	2.34	1.32	3.05	1.85	Average temperature
194	99.500 3895	2.37	1.32	2.70	1.47	
196	100.500 3876	2.60	1.50	3.80	1.75	72°
197	101.000 3867	2.31	1.26	5.40	2.00	
198	101.500 3857	2.80	1.20	4.90	1.70	
187	102.500 3838	4.20	2.70	4.35	2.30	
200	103.000 3829	2.95	1.50	5.30	2.30	
201	103.500 3819	4.30	1.70	2.16	1.32	
203	104.500 3802	2.95	1.70	2.31	1.26	
204	105.000 3793	2.60	1.35	3.60	1.45	
205	105.500 3783	3.00	1.40	2.60	1.50	
207	106.500 3764	3.40	1.70	2.80	1.35	
208	107.000 3755	2.90	1.70	2.80	1.45	
209	107.500 ~~3836~~ 3745	4.05	1.80	3.35	1.75	

* * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.65	4.30	2.31	3.08	3.63	1.63	1.45	0.470
WEST	1.02	5.40	2.16	3.53	4.39	1.68	1.85	0.524
COMB	0.87	~~4.33~~ 5.40	2.16	3.30	4.04	1.66	1.65	0.499

* * * * * HISTORY * * * * *

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

20

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 32/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 110.00
ENDING MP..... 131.00
COMPLTED MILES.. 21.00

LAB NO..... RR1-1027
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 14:10

(correction after 110-100)
sta times 19
plus 57
110 = 2126
1246 = 2391

ROAD RATER DEFLECTION (MILS)

	M-P	EASTBOUND SENS 1	EASTBOUND SENS 2	WESTBOUND SENS 1	WESTBOUND SENS 2	REMARKS
2239	115.000	3602	3.40	1.80	4.90	1.60	
2380	122.500	3459	3.40	2.00	3.70	1.80	
2393	123.000	3450	2.95	1.70	3.30	1.80	
2402	123.500	3440	2.70	1.40	3.45	1.80	
2422	124.500	3421	1.89	1.29	3.15	1.90	Average temperature 72°
2432	125.000	3412	2.28	1.38	2.58	1.53	
2441	125.500	3402	2.70	1.50	2.90	1.50	
2460	126.500	3383	3.50	1.90	3.70	1.60	
2469	127.000	3374	4.50	1.50	4.50	1.40	
2478	127.500	3364	3.45	2.10	4.05	1.50	
2497	128.500	3345	2.75	2.00	4.65	1.75	
2506	129.000	3336	3.20	2.60	4.05	1.70	
2516	129.500	3326	3.15	1.70	4.00	1.60	
2535	130.500	3307	3.30	1.75	2.67	1.41	
2545	131.000	3298	2.34	1.50	3.70	1.50	

95

SUMMARY OF DATA

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.63	4.50	1.89	3.03	3.57	1.74	1.29	0.426
WEST	0.70	4.90	2.58	3.69	4.27	1.63	2.06	0.559
COMB	0.73	~~4.50~~ 4.90	1.89	3.36	3.98	1.68	1.68	0.499

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

2.0

PROGRAM NUMBER- PE220050
COMPUTER RUN DATE- 43/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE..

BEGINNING MP.... 131.00
ENDING MP..... 152.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1028
YEAR BUILT.. 1980
DATE TESTED. - -

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 14:20

ROAD RATER DEFLECTION (MILS)

	EASTBOUND			WESTBOUND		
	M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
2552	131.500 3288	2.31	1.58	3.60	1.35	
2632	135.500 3212	4.30	1.85	3.40	1.70	
2641	136.000 3203	2.95	1.80	3.00	1.80	
2650	136.500 3193	4.60	2.70	3.35	2.10	
2669	137.500 3174	4.50	2.30	6.10	2.60	
2679	138.000 3164	4.70	2.30	4.55	2.35	
2688	138.500 3155	5.20	2.60	7.40	2.40	
2707	139.500 3136	2.22	1.35	2.80	1.40	
2716	140.000 3126	2.25	1.32	3.20	1.55	
2726	140.500 3117	2.40	1.44	3.70	2.00	
2745	141.500 3098	3.15	1.50	3.00	1.45	
2754	142.000 3088	2.90	1.80	3.50	2.00	
2764	142.500 3079	2.85	1.75	3.95	1.95	
2783	143.500 3060	4.20	1.60	3.15	1.30	
2795	144.000 3051	2.34	0.78	4.10	1.65	
2804	144.500 3041	4.05	1.50	4.35	1.75	
2823	145.500 3022	3.00	1.45	3.45	1.85	
2832	146.000 3012	3.40	2.15	3.00	1.60	
2842	146.500 3003	2.52	1.50	3.15	1.60	
2861	147.500 2984	2.85	1.75	3.60	2.00	
2870	148.000 2975	3.60	2.25	3.00	1.90	
2880	148.500 2965	3.45	2.50	3.10	2.00	
2909	150.000 2937	3.70	1.90			

Average temperature 72°

96

* * * * * * * * * S U M M A R Y O F D A T A * * * * * * * * * * * * * * * * * H I S T O R Y * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.90	5.20	2.22	3.37	4.12	1.82	1.55	0.461
WEST	1.09	7.40	2.80	3.75	4.67	1.83	1.92	0.511
COMB	1.00	~~5.20~~ 7.40	2.22	3.55	4.40	1.82	1.73	0.487

REMARKS: TAAN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

1.9

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 54/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE- D053
PAVEMENT TYPE..

BEGINNING MP.... 152.00
ENDING MP..... 305.00
COMPUTED MILES.. 153.00

LAB NO..... RR1-1029
YEAR BUILT.. 1980
DATE TESTED. 08-13-80

WEATHER CLDY
OBS.... SMITH & TRITSCH
TIME... 14:30

ROAD RATER DEFLECTION (MILS)

	EASTBOUND			WESTBOUND		
	M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
3002	155.000 2842			3.50	1.70	
3097	160.000 2747	2.40	0.78			
3192	165.000 2652			3.15	1.25	Average temperature
3289	170.000 2557	3.70	2.35			72°
3384	175.000 2462			3.50	2.00	
3479	180.000 2367	3.40	1.85			
3574	185.000 2272			2.80	1.60	
3669	190.000 2177	4.05	2.15			
3764	195.000 2085			3.30	2.00	
3857	200.000 1990	4.35	1.70			
3952	205.000 1895			4.90	3.10	
4047	210.000 1800	3.20	1.55			
4142	215.000 1705			3.15	2.15	
4237	220.000 1610	3.00	1.40			
4332	225.000 1515			3.90	2.10	
4427	230.000 1420	3.00	1.80			
4522	235.000 1325			1.86	1.14	
4617	240.000 1230	3.05	1.60			
4712	245.000 1135			7.00	4.10	
4807	250.000 1040	2.70	1.30			
4902	255.000 945			2.46	1.47	
4997	260.000 850	2.55	1.38			
5093	265.000 755			4.40	2.00	@ Wind = 5 mph
5188	270.000 660	3.80	1.35			
5283	275.000 565			3.40	1.85	
5378	280.000 470	2.46	1.74			
5473	285.000 380			5.10	2.60	
5568	290.000 285	5.00	3.00			
5663	295.000 190			4.60	2.30	SECL
5758	300.000 95	6.20	2.60			SECH
5853	305.000 0			5.80	3.30	SECL

5.23/cond

* * * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * * * * HISTORY * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	1.05	6.20	2.40	3.52	4.40	1.77	1.75	0.498
WEST	1.31	7.00	1.86	3.93	5.03	2.17	1.76	0.448
COMB	1.19	~~6.20~~ 7.00	1.86	3.73	4.73	1.97	1.76	0.471

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

PROGRAM NUMBER- P2220053
COMPUTER RUN DATE- 11/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. AC

BEGINNING MP.... 0.0
ENDING MP..... 23.00
COMPUTED MILES.. 23.00

LAB NO..... RR1-1014
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:00

ROAD RATER DEFLECTION (MILS)

M-P	EASTBOUND SENS 1	EASTBOUND SENS 2	WESTBOUND SENS 1	WESTBOUND SENS 2	REMARKS
1.650	1.74	1.50			
5.000	1.44	1.20	1.20	1.08	
8.500	1.84	1.60	1.44	1.36	
9.000	1.64	1.40	1.24	1.20	
9.500	1.60	1.32	1.52	1.32	
10.500	1.56	1.32	1.20	1.00	TOTS
11.000	1.56	1.40	1.64	1.60	
11.500	1.40	1.32	1.44	1.28	
12.500	1.56	1.40	1.40	1.36	
13.000	1.44	1.32	1.60	1.48	
13.500	1.28	1.16	1.44	1.36	
14.500	1.60	1.28	1.68	1.56	
15.000	1.80	1.60	1.44	1.40	TOSS
15.500	2.40	1.92	1.60	1.44	
16.500			1.20	1.12	
17.000	1.56	1.24	1.00	0.96	
17.500	1.24	1.00	1.16	1.00	

C-22

MG-30 C

Average temperature 65°

98

* * * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.27	2.40	1.24	1.60	1.83	1.37	0.23	0.143
WEST	0.20	1.68	1.00	1.39	1.56	1.28	0.10	0.076
COMB	0.26	2.40	1.00	1.50	1.71	1.33	0.17	0.112

* * * * HISTORY * * * *

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

3.6

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 12/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. AC

BEGINNING MP.... 23.00
ENDING MP..... 47.05
COMPUTED MILES.. 24.05

LAB NO..... RR1-1015
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:10

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
24.000	1.84	1.20	2.34	1.50	
30.000	1.60	1.28	2.10	1.44	
35.500	2.10	1.26	1.40	1.12	
36.000	2.34	1.32	1.40	1.20	
36.500	1.86	1.20	1.60	1.20	Average temperature 65°
37.500	2.10	1.20	1.60	1.00	
C-22 38.000	1.60	1.48	1.86	1.20	
38.500	1.80	1.16	1.92	1.32	
39.500	1.68	1.08	1.80	1.26	
40.000	2.04	1.32	1.80	1.32	
40.500	1.92	1.20	1.80	1.20	
41.500	2.40	1.32	2.10	1.50	
MG-300 42.000	2.37	1.32	1.80	1.20	
42.500	2.64	1.50	1.40	0.88	
43.500	2.16	1.32	1.76	1.32	
44.000	2.16	1.32	1.76	1.20	
44.500	2.10	1.20	1.60	1.16	

99/66

**********SUMMARY OF DATA**********

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.28	2.64	1.60	2.05	2.29	1.28	0.78	0.379
WEST	0.26	2.34	1.40	1.77	1.98	1.24	0.53	0.300
COMB	0.30	2.64	1.40	1.91	2.16	1.26	0.65	0.343

*****HISTORY*****

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

3.1

PROGRAM NUMBER- P222005D
COMPUTER RUN DATE- 12/02/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE- D053
PAVEMENT TYPE.. AC

BEGINNING MP.... 47.35
ENDING MP..... 67.00
COMPUTED MILES.. 19.65

LAB NO..... RR1-1016
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:20

C-22

MG 300

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
53.500	2.34	1.50	1.80	1.36	SECH SECL
54.000	2.10	1.50	1.56	1.20	SECH SECL
54.500	2.34	1.56	1.60	1.20	SECH SECL
55.500	2.04	1.50	1.44	1.16	SECH SECL
56.000	2.10	1.44	1.40	1.20	SECH SECL
56.500	2.10	1.50	1.76	1.24	SECH SECL
57.500	1.80	1.38	1.24	1.00	SECH SECL
58.000	1.92	1.32	1.52	1.20	SECH SECL
58.500	2.10	1.50	1.48	1.28	SECH SECL
59.500	1.56	1.04	1.16	1.08	SECH SECL
60.000	1.92	1.26	1.56	1.20	SECH SECL
60.500	1.92	1.50	1.64	1.36	SECH SECL
61.500	2.34	1.50	1.20	1.00	SECH SECL
62.000	1.64	1.20	1.40	1.12	SECH SECL
62.500	2.10	1.50	1.20	1.00	SECH SECL
67.000	1.80	1.14	1.20	0.88	

Average temperature 65°

100

SUMMARY OF DATA

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.23	2.34	1.56	2.01	2.20	1.40	0.61	0.304
WEST	0.20	1.80	1.16	1.45	1.62	1.15	0.29	0.202
COMB	0.36	2.34	1.16	1.73	2.03	1.28	0.45	0.262

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

3.2

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 33/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. AC

BEGINNING MP.... 68.00
ENDING MP..... 89.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1017
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:30

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
71.500	3.50	1.70	2.34	1.50	
72.000	2.70	1.32	2.34	1.44	
72.500	2.70	1.32	2.10	1.44	
73.500	3.00	1.90	2.40	1.68	
74.000	2.76	1.50	2.10	1.20	Average temperature 55°
74.500	3.00	1.70	2.40	1.62	
75.500	4.00	2.20	1.80	1.08	
76.000	2.76	1.50	2.10	1.68	
76.500	3.00	1.10	2.04	1.20	
77.500	2.70	1.32	1.92	1.16	
78.000	3.30	1.90	2.10	1.32	
78.500	3.00	1.50	2.04	1.32	TOSS
79.500	3.50	2.00	2.10	1.20	
80.000	2.70	1.32	2.10	1.20	
80.500	2.52	1.32	1.80	1.20	

C-22

MIG-300

101

* * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * * * * HISTORY * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.40	4.00	2.52	3.01	3.35	1.57	1.44	0.477
WEST	0.19	2.40	1.80	2.11	2.27	1.35	0.76	0.361
COMB	0.55	4.00	1.80	2.56	3.03	1.46	1.10	0.429

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

23

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 44/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. SC

BEGINNING MP.... 89.00
ENDING MP..... 110.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1018
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:40

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
98.000	2.52	1.32	2.16	1.20	
99.000	2.40	1.32	2.70	1.50	
99.500	2.10	1.20	2.40	1.50	
100.500	2.40	1.32	2.64	1.50	Average temperature 55°
101.000	2.76	1.50	2.70	1.50	
101.500	2.46	1.32	2.46	1.74	
102.500	3.50	2.20	2.40	1.50	
103.000	2.04	1.20	2.90	1.80	
103.500	3.00	1.50	1.92	1.14	
104.500	3.30	1.60	2.40	1.20	
105.000	2.34	1.20	2.46	1.26	
105.500	3.50	1.60	2.28	1.32	
106.500	2.52	1.50	2.10	1.26	
107.000	2.70	1.62	2.10	1.32	
107.500	3.60	2.20	2.22	1.50	

C-22

MG-306

102

SUMMARY OF DATA

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.52	3.60	2.04	2.78	3.21	1.54	1.24	0.446
WEST	0.27	2.90	1.92	2.41	2.64	1.44	0.97	0.402
COMB	0.45	3.60	1.92	2.59	2.97	1.49	1.10	0.426

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

235

PROGRAM NUMBER- P2220050
COMPUTER RUN DATE- 55/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. SC

BEGINNING MP.... 110.00
ENDING MP..... 131.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1019
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 14:50

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
115.000	3.00	1.40	3.90	1.60	
122.500	2.90	1.50	3.30	1.70	
123.000	3.40	1.50	3.10	1.50	
123.500	3.00	1.50	3.50	1.50	
124.500	2.80	1.20	2.70	1.50	
125.000	3.10	1.50	3.10	1.50	
125.500	3.60	1.50	3.40	1.60	
126.500	3.50	1.80	3.00	1.50	
127.000	3.50	1.60	3.50	1.60	
127.500	3.40	1.60	6.00	1.80	
128.500	3.60	1.50	3.30	1.50	
129.000	3.70	1.50	4.00	2.00	
129.500	3.90	1.50	3.40	1.50	
130.500	3.00	1.00	2.90	1.50	
131.000	2.90	1.00	3.00	1.40	

C-22

NG-300

Average temperature 55°

103

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.35	3.90	2.80	3.29	3.58	1.44	1.85	0.562
WEST	0.78	6.00	2.70	3.47	4.13	1.58	1.89	0.545
COMB	0.60	3.90	2.70	3.38	3.89	1.51	1.87	0.553

6.00

SUMMARY OF DATA

HISTORY

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

1.9

PROGRAM NUMBER- P222005C
COMPUTER RUN DATE- 66/15/80

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. D053
PAVEMENT TYPE.. SC

BEGINNING MP.... 131.00
ENDING MP..... 152.00
COMPUTED MILES.. 21.00

LAB NO..... RR1-1020
YEAR BUILT.. 1980
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 15:00

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
131.500	3.10	1.20	3.00	1.20	
135.500	3.20	1.40	3.30	1.60	
136.000	3.20	1.60	3.20	1.60	
136.500	3.60	2.00	3.10	1.50	
137.500	4.20	2.10	3.80	2.20	
138.000	4.20	2.50	3.90	2.00	
138.500	3.00	1.70	6.00	3.80	
139.500	2.90	1.20	2.86	1.50	
140.000	2.90	1.30	3.20	1.20	
140.500	3.10	1.50	2.70	1.32	
141.500	3.20	1.50	3.40	1.40	
142.000	3.50	1.90	3.30	1.60	
142.500	4.40	2.10	3.30	2.00	
143.500	2.80	1.00	3.10	1.50	
144.000	2.52	1.14	3.10	1.20	
144.500	2.76	1.32	2.10	0.96	
145.500	3.50	2.00	4.80	2.20	
146.000	3.20	1.90	3.50	1.90	
146.500	3.50	1.50	3.50	1.60	T060
147.500	3.00	1.50	3.10	1.70	
148.000	3.00	1.60	2.82	1.26	
148.500	3.10	1.70	2.40	1.80	T050
150.000	2.70	1.02			

C-22

MG-300

C-34

Average temperature 55°

104

1.9

* * * * * * * * * SUMMARY OF DATA * * * * * * * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	0.49	4.40	2.52	3.24	3.65	1.59	1.65	0.508
WEST	0.80	6.00	2.10	3.34	4.01	1.68	1.66	0.496
COMB	0.65	~~4.40~~ 6.00	2.10	3.29	3.84	1.64	1.65	0.502

* * * * * HISTORY * * * * *

REMARKS: TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

PROGRAM NUMBER- P2220060
COMPUTER RUN DATE- 77/12/60

OFFICE OF MATERIALS
ROAD RATER TESTS

COUNTY- DUBUQUE
SECONDARY ROUTE. DC53
PAVEMENT TYPE.. AC

BEGINNING MP.... 152.00
ENDING MP..... 305.00
COMPUTED MILES.. 153.00

LAB NO..... RR1-1021
YEAR BUILT.. 1960
DATE TESTED. 10-13-80

WEATHER CLDY
OBS.... TWOHEY & TRITSCH
TIME... 15:10

ROAD RATER DEFLECTION (MILS)

	EASTBOUND		WESTBOUND		
M-P	SENS 1	SENS 2	SENS 1	SENS 2	REMARKS
155.000			0.96	0.80	
160.000	0.66	0.42			
165.000			0.82	0.68	
170.000	1.04	0.84			
175.000			1.52	1.00	
180.000	2.40	1.56			
185.000			1.64	1.16	
190.000	2.52	1.32			
195.000			1.56	1.20	
200.000	1.92	1.20			
205.000			1.60	1.28	
210.000	2.46	1.44			
215.000			2.82	2.10	
220.000	3.94	1.80			T070
225.000			2.40	2.10	
230.000	2.46	1.62			
235.000			2.40	1.50	
240.000	3.10	1.50			
245.000			3.00	1.50	
250.000	1.50	1.30			
255.000			4.40	2.30	
260.000	2.22	1.20			
265.000			3.30	1.70	T030
270.000	3.10	1.50			
275.000			3.60	1.50	
280.000	3.10	1.60			
285.000			4.00	2.20	
290.000	4.00	2.00			
295.000			3.40	1.90	SECL
302.000	6.00	3.00			SECH

Average temperature 50°

* * * * * * * * SUMMARY OF DATA * * * * * * * * * * * * * * * * HISTORY * * * * *

DIRECTION	SENS1 STD.DEV.	SENS1 MAX.	SENS1 MIN.	SENS1 AVE.	SENS1 80%	SENS2 AVE.	SCI	SCI/SENS1
EAST	1.27	6.00	0.66	2.63	3.69	1.49	1.14	0.434
WEST	1.11	4.40	0.82	2.51	3.44	1.53	0.98	0.391
COMB	1.17	6.00	0.66	2.57	3.55	1.51	1.06	0.413

TNNN- SURFACE TEMPERATURE. SECL- SUPERELEVATED CURVE, LOW SIDE. SECH- SUPERELEVATED CURVE, HIGH SIDE

Appendix F

Special Provisions

IOWA DEPARTMENT OF TRANSPORTATION
Ames, Iowa

Special Provisions
for

EMULSION TREATED MACADAM

Dubuque County SN-4657(3)--51-31

July 15, 1980

THE STANDARD SPECIFICATIONS, SERIES OF 1977, ARE AMENDED BY THE FOLLOWING ADDITIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

GENERAL. The work on this project includes several variations of base and wearing course construction, all described on the plans. This specification describes emulsion treated Macadam base and the related emulsion treated choke stone base, neither of which is described elsewhere in the specifications, and modifications to other standard specifications relating to this project.

Certain aspects of this project are of a research nature, and requirements may be changed by the engineer in order to make these aspects more meaningful.

EMULSION TREATED MACADAM BASE AND EMULSION TREATED CHOKE STONE COURSE

MATERIALS. Aggregate for emulsion treated Macadam and emulsion treated choke stone courses shall be the product of crushing limestone, dolomite, or quartzite and shall meet the following requirements:

A. Abrasion Loss. The percentage of wear, determined in accordance with AASHTO T 96, Grading A or B, shall not exceed 45.

B. Soundness. When subjected to the freezing-and-thawing test, Laboratory Test Method 211, Method C, the percentage loss shall not exceed 10.

C. Gradation. The aggregate for both base course and choke stone course shall be produced from the same source by primary crusher, both products of that operation. The gates or breaker bars shall be adjusted to produce a nominal maximum size of 3 inches, and the product of the primary crusher shall be screened over a 3/4-inch screen. The aggregate retained on the 3/4-inch screen shall be furnished as the aggregate for emulsion treated Macadam base course.

The aggregate passing the 3/4-inch screen shall be furnished as the aggregate for emulsion treated choke stone course; however, the percentage of fines passing the No. 200 sieve shall not exceed 5.0 percent for the choke stone course aggregate that is to be treated with emulsion.

Emulsion for emulsion treated Macadam base and emulsion treated choke stone courses shall meet requirements of AASHTO M 140-79I, Grades HFMS-2 or CSS-1. This material or CRS-2 shall also be used for tack coats, if required.

PLANT EQUIPMENT. Article 2205.04 shall apply.

SPREADING EQUIPMENT. Spreading equipment for emulsion treated Macadam base shall be capable of uniformly depositing and spreading the base material to the required thickness. Equipment described in 2001.19 may be used.

Spreading equipment for emulsion treated choke stone course shall meet requirements of 2001.19.

HEATING EQUIPMENT. Article 2001.11 shall apply.

COMPACTION EQUIPMENT. Compaction equipment used shall be of such design that its operation shall not disturb the subgrade or subbase. Initial compaction of the Macadam base shall be by use of a self-propelled vibratory roller, and the engineer may require additional compaction by a steel-tired roller or a pneumatic-tired roller. The same rollers shall be used for the emulsion treated choke stone course, but the engineer may prohibit or restrict use of the self-propelled vibratory roller. Compaction equipment shall meet requirements of 2001.04.

WEIGHING EQUIPMENT. Article 2001.07 shall apply.

DISTRIBUTOR. Article 2001.12 shall apply.

CONSTRUCTION. The subgrade for these bases will be prepared by the county.

At railroad crossings, junctions with existing pavements, bridges, and similar structures, the contractor shall excavate the roadbed to prepare a subgrade to permit the full thickness of courses designated on the plans to be constructed to the proper elevation. In this operation, the granular material existing on the roadbed shall be salvaged and respread over the disturbed area when excavation work is completed.

Placement of filter fabric is also anticipated. This material will be placed in two, 200-foot areas in each test section, Placement will be by others prior to the base-spreading operation. This work will be coordinated by the engineer. The contractor will have no responsibility for either furnishing or placing filter fabric, but his cooperation will be necessary to provide satisfactory construction.

The emulsion treated Macadam base and choke stone course shall be mixed in accord with 2205.12A, C, E, F, and G. The aggregate is not to be heated prior to or during the mixing process, and asphalt cement will not be allowed as an alternate to the emulsion. The bituminous material anticipated necessary for the mixtures for both courses is 4 parts of emulsion per 100 parts of aggregate (on a weight basis). The proportioning shall maintain the amount designated by the engineer within a tolerance of 0.4 part, determined by tank measurements.

Addition of water during the mixing process is anticipated. The amount of both emulsion and water to be used may be adjusted by the engineer.

The emulsion treated Macadam base material and the emulsion treated choke stone material shall be spread in courses as shown on the plans. The material shall be spread to such width and depth that each course will conform to the desired profile and cross section. The intention is that each course will be spread to achieve its full thickness in one operation, though multiple passes may be used to obtain the desired width. A tack coat may be required between these courses, as provided in 2303.14.

The emulsion treated Macadam base material shall be thoroughly and uniformly compacted promptly after it is spread. Compaction shall continue until the material is well seated to the satisfaction of the engineer.

The emulsion treated Macadam choke stone course shall be thoroughly and uniformly compacted promptly after it is spread. Three complete coverages with a vibratory roller are anticipated. An additional final rolling with a smooth-faced, steel-tired or pneumatic-tired roller will be required. The finished surface shall be free from irregularities and loose material and shall have a smooth riding surface.

The emulsion treated choke stone course may be tack coated in accord with 2303.14, as directed by the engineer, prior to placement of the next course.

Each section of completed or partially completed course shall be maintained as provided in 2205.12M.

METHOD OF MEASUREMENT. The quantities of the various classes of work involved in the construction of accepted portions of emulsion treated Macadam stone base and emulsion treated choke stone base will be measured by the engineer as follows:

A. Emulsion Treated Macadam Stone Base will be measured in tons computed by the engineer from weights of individual truck loads, and will include base material for fillets at intersecting roads, drives, and turnouts.

B. Emulsion Treated Choke Stone Base will be measured in tons computed by the engineer from weights of individual truck loads, including base material for fillets at intersecting roads, drives, and turnouts.

C. Primer or Tack-Coat Bitumen. Paragraph 2307.06B shall apply.

D. Emulsion, Treated Base Material. The engineer will measure the gallons of emulsion used in emulsion treated Macadam base and emulsion treated choke stone base. The quantity will also include emulsion used in the mixture for the stabilized shoulders. Measurement will be by stick measurement in the contractor's storage tank before and after transport delivery or by weighing trucks on or near the project before and after delivery to the storage tanks. From this quantity will be deducted the measured or estimated quantity diverted to other uses on or off the project or wasted. The quantity will be converted to U. S. standard gallons as provided in 2307.06B.

BASIS OF PAYMENT. For the performance of the various classes of work involved in construction of emulsion treated Macadam stone base and emulsion treated choke stone base, measured as provided above, the contractor will be compensated as follows:

A. Emulsion Treated Macadam Stone Base. For the number of tons of Emulsion Treated Macadam Stone Base placed, the contractor will be paid the contract price per ton.

B. Emulsion Treated Choke Stone Base. For the number of tons of Emulsion Treated Choke Stone Base placed, the contractor will be paid the contract price per ton.

C. Primer or Tack-Coat Bitumen. For the number of gallons of Primer or Tack-Coat Bitumen placed, the contractor will be paid the contract price per gallon. Article 1109.03 shall not apply to this item.

D. Emulsion Treated Base Material. For the number of gallons of emulsion used in treated base material, the contractor will be paid the contract price per gallon.

This payment shall be considered full compensation for furnishing all materials, including water, and for all operations involved in the construction of the base.

MODIFICATION TO SECTION 2124, STABILIZED SHOULDERS

DELETE 2124.02 and add the following in lieu thereof:
2124.02 MATERIALS. The mixture used for emulsion treated base for shoulder areas and tack-coat material, if required, shall be those specified for emulsion treated choke stone course.

DELETE from 2124.07 the requirement for sealer bitumen and sand cover aggregate.

DELETE 2124.09 and 2124.10 and add the following in lieu thereof:
2124.09 MEASUREMENT AND PAYMENT. The base material used in the shoulders will be measured and paid for in the same manner as emulsion treated choke stone course. The emulsion used therein will be paid for separately, and the quantity will be included with the emulsion for the choke stone course.

MODIFICATIONS TO SECTION 2202, ASPHALT TREATED BASE

DELETE all of 2202.02A and add the following in lieu thereof:
A. Bituminous Material. AC used in asphalt treated base shall meet requirements of Section 4137, Grade AC-5.
Tack-coat bitumen shall be emulsion meeting requirements of AASHTO M 140-79I, Grade HFMS-2, CSS-1, or CRS-2.

MODIFICATIONS TO SECTION 2203, TYPE B ACC BASE

DELETE all of 2203.02A and add the following in lieu thereof:
A. Bituminous Material. AC used in Type B ACC Base shall meet requirements of Sections 4137, Grade AC-5.
Tack-coat bitumen shall be emulsion meeting requirements of AASHTO M 140-79I, Grade HFMS-2, CSS-1, or CRS-2.

MODIFICATIONS TO SECTION 2210, MACADAM STONE BASE

DELETE 4122.02C and add the following in lieu thereof:
C. Gradation. The aggregate for both base course and choke stone course shall be produced from the same source by a primary crusher, both products of that operation. The gates or breaker bars shall be adjusted to produce a nominal maximum size of 3 inches, and the product of the primary crusher shall be screened over a 3/4-inch screen. The aggregate retained on the 3/4-inch screen shall be furnished as the Macadam base course material.
The aggregate passing the 3/4-inch screen shall be furnished as the choke stone course material, but with a maximum of 12 percent passing the No. 200 sieve.

ADD the following to 2210.04B8. Equipment meeting requirements of 2001.19 shall be used for spreading the choke stone course.

DELETE all of 2210.04C2 and add the following in lieu thereof:
2. Moisture Content. Aggregate for the choke stone course shall be delivered, without prewetting, with only the moisture naturally occurring in the material. Water shall be added to the surface before or during compaction, if necessary, at the direction of the engineer.

MODIFICATIONS TO SECTION 2307, BITUMINOUS SURFACE TREATMENT

DELETE all of 2307.02B and add the following in lieu thereof:
B. Bituminous Material for seal coats shall meet requirements of AASHTO M 140-79I, Grade HFMS-2 or CRS-2.